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Vol. 37 / No. 222

DO-IT-ALL COMBINATION ROUTER TABLE

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Fast, Foolproof Drawer Joinery

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Projects, Products & Techniques for Your Table Saw & Router Table

A Publication of August Home Publishing

Woodsmith®

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from the editor

Sawdust

Learning something new is always a challenge. Reading a magazine like *Woodsmith* and then building the projects or trying out the techniques featured in the pages is a great way to advance your skills. But it does have its limitations. Sometimes it's nice to see things in action — something the words, photos, and illustrations can't always convey.

To meet that need, we've launched the all-new *Woodsmith Video Edition*. I can't tell you how excited and pleased I am with the final result. The *Video Edition* features projects, tips, and techniques from the magazine along with new content. The big difference is that we use video to bring it all to life. The *Video Edition* comes out every two weeks and contains a mix of videos ranging from furniture and shop projects to tips and techniques.

To satisfy everyone's desire for more woodworking information, in each off week a *Talking Shop Edition* is released. There you'll find a *Talking Shop* video, where we get into more detail about a specific woodworking topic. You also receive another shop tip video. All in all, there'll be over 125 new videos every year.

If the *Video Edition* of *Woodsmith* sounds interesting, it's easy to check things out. Just visit *WoodsmithVideoEdition.com* to watch a variety of full-length and preview videos. Becoming a member is simple: choose either the yearly or monthly option, and you'll be off and running. Check it out and give it a try. We've worked long and hard on it, and I'm sure you won't be disappointed — we sure aren't.

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1. Free or nominal rate outside-county copies included on PS form 3541	735	1228
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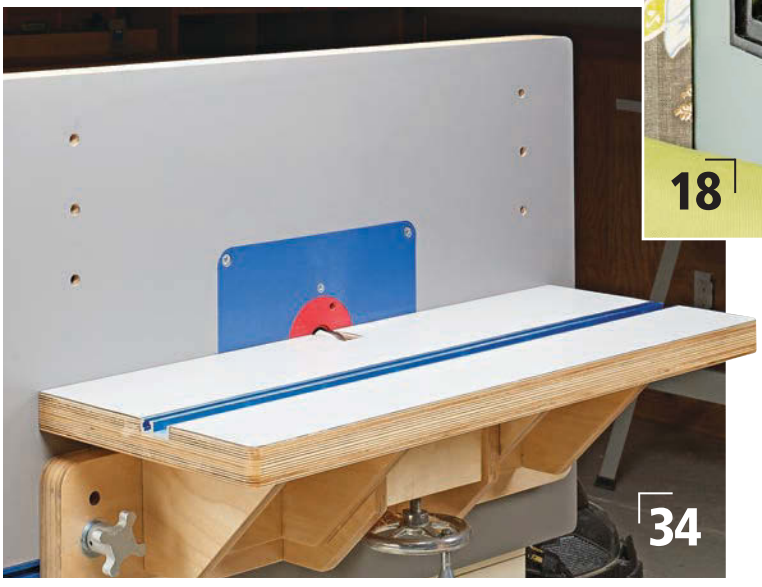
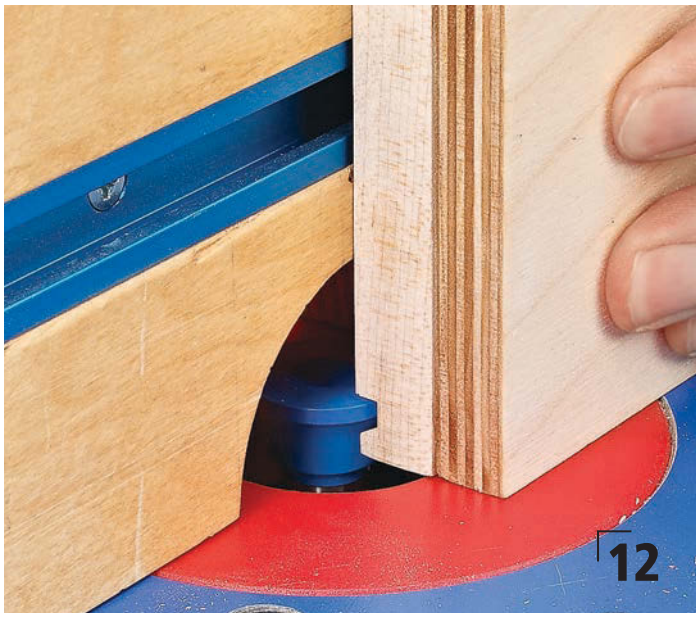
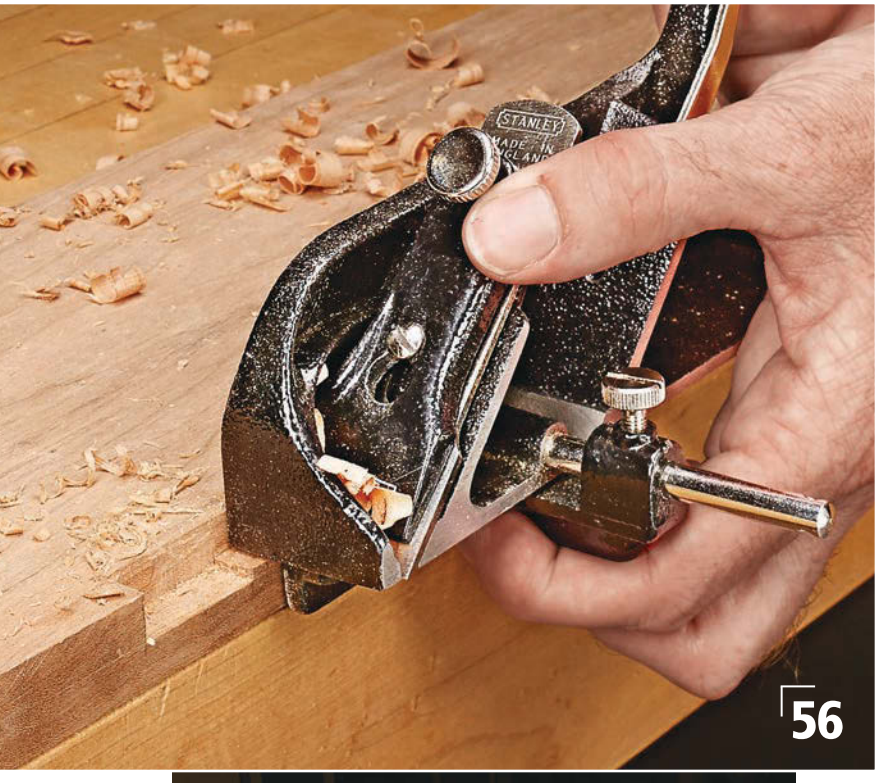


Projects





Departments

from our readers

Tips & Techniques

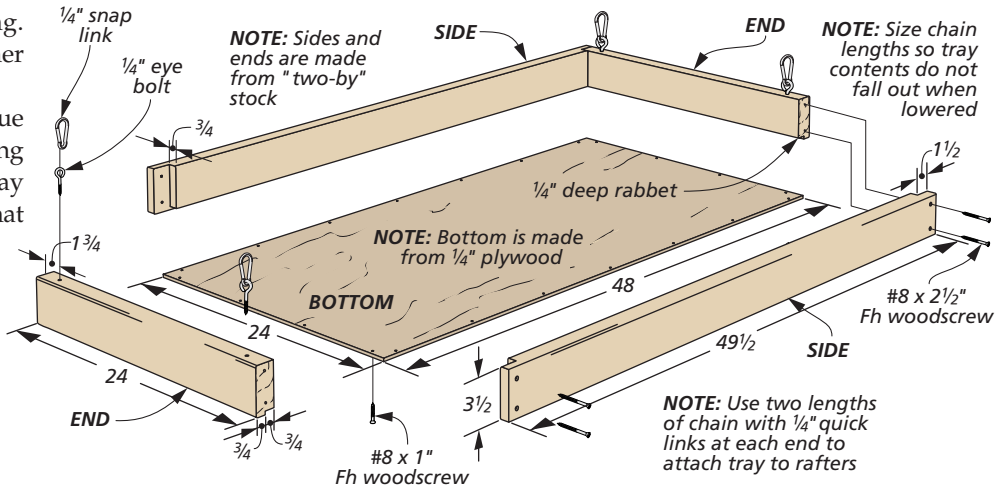
Overhead Storage Tray

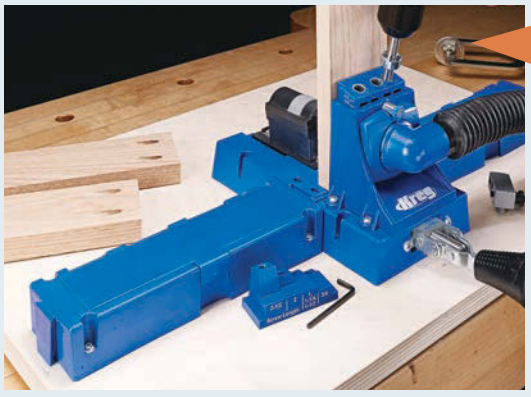
My small shop doesn't have much room for storage. Especially when it comes to delicate sheets of veneer and various lightweight items that are easily damaged or misplaced. To solve this storage problem, I made this shallow tray that's mounted to the rafters in the ceiling. You can see how the tray goes together in the drawing at right.

CREATIVE MOUNTING SYSTEM. What's unique about this tray is the system for raising and lowering it. Each corner of the tray features eye bolts and snap links that match up with eye bolts on the rafters. Connecting the snap links with the rafter-mounted eye bolts holds the tray closed (inset photo).

Both front corners of the tray, however, also have a short length of chain that's connected between the eye bolts with quick links. To access the tray, release the snap links and gently lower the tray until it's supported by the chains.

Jeffrey Martel
Seattle, Washington





Win This Kreg K5 Jig

Simply send us your favorite shop tips. If your tip or technique is selected as the featured reader's tip, you'll win a *Kreg K5 Jig* just like the one shown here. To submit your tip or technique, just go online to *Woodsmith.com* and click on the link, "SUBMIT A TIP." There you can submit your tip and upload your photos for consideration.

The Winner!

Congratulations to William Hope, the winner of this *Kreg K5 Jig*. To find out how you can win this jig, check out the information at left.

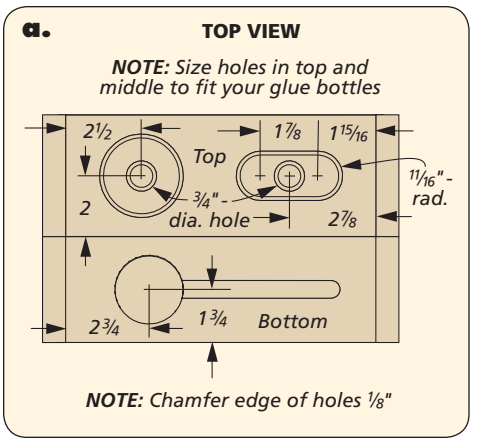
Glue-Bottle Rack

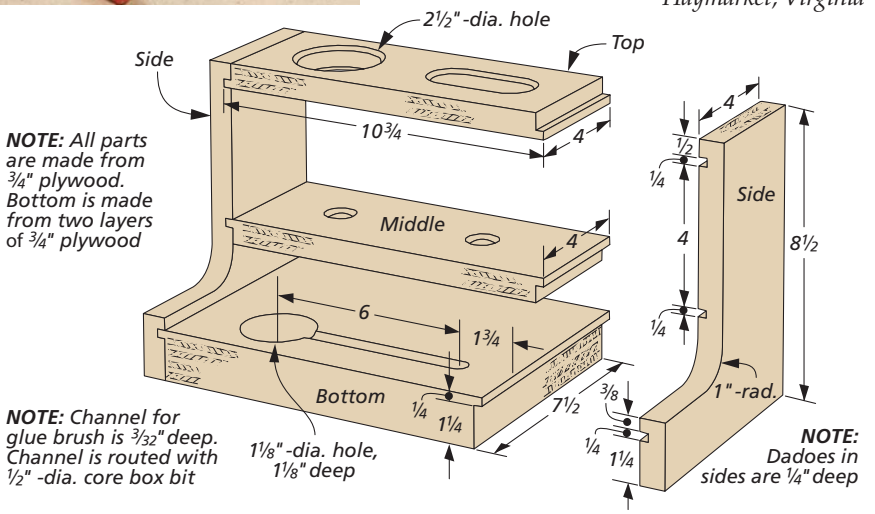
Waiting for glue to flow from the bottom of the glue bottle to the tip is one of my pet peeves in the shop. Instead of waiting, I store a couple bottles in this handy rack that keeps the bottles upside-down so the glue is always ready to go.

EXPANDABLE DESIGN. I made my rack to hold the two bottles that I use the most, but it could easily be expanded by making the center sections longer. The whole rack is made from plywood. Tongues cut on the ends of the center sections slip into dadoes cut in the sides.

To add even more versatility, I drilled a large hole in the bottom tray that is sized to hold a disposable plastic cup. A glue brush rests in a groove cut next to the plastic cup hole. Excess glue drips into the cup.

William Hope
Haymarket, Virginia





QUICK TIPS

Chamfered Shelf Edges. *Bill Webber* of *Grand Junction, Colorado,* was faced with the task of sliding some plywood shelves into dadoes in an already assembled case. To allow the shelves to slide easily into the dadoes, he chamfered the shelf edges, stopping just shy of the front edge.

Rafter Hooks. Needing a quick and customizable storage solution for hanging extension cords and other lightweight items, *Lyle Qualley* of *Tekamah, Nebraska*, made a couple simple rafter hooks from leftover plywood. The hooks are made to slip over the exposed rafters in his shop. He sized his hooks so they were easy to reach without a stool, yet high enough to be out of the way.

Flattening a Worn Waterstone

The center of a waterstone gets the most use no matter how careful you are to use the entire surface of the stone when sharpening. This means the stone is likely to get dished out in the center after just a few sharpening sessions. One of the quickest and most effective methods I've found for flattening the surface is to "scrub" the stone using a sanding screen.

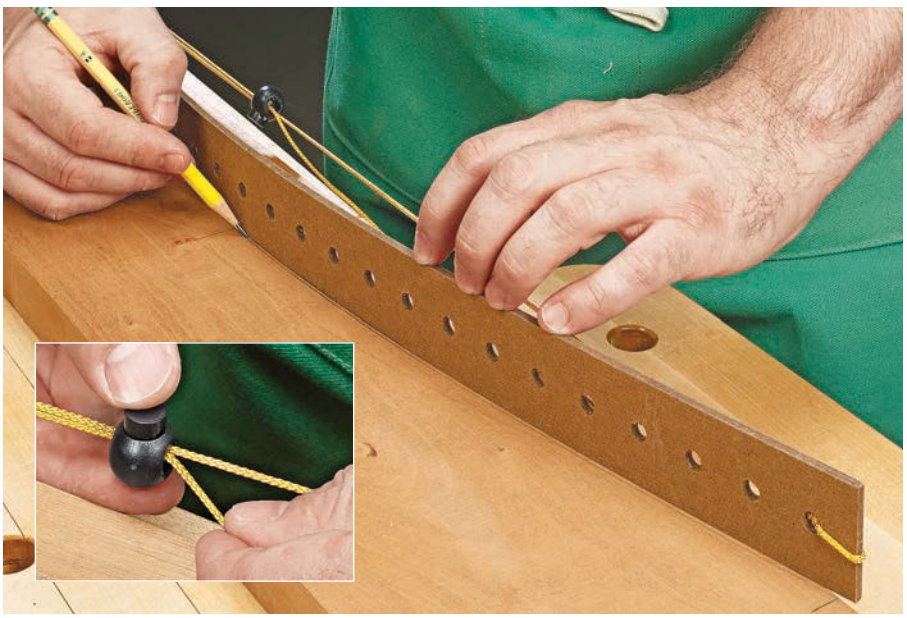
THE SETUP. Sanding screens can be found at most home centers. They are generally used for smoothing drywall joint compound. I used a 120-grit screen taped to a flat surface for my waterstones.

THE METHOD. Before starting, draw a wavy pencil line on the bottom of the stone (inset photos). This helps track your progress. Using a circular motion, rub the stone over the flat screen. If needed, sprinkle the screen with water occasionally to keep it from clogging up. When the pencil lines are gone, you're done.

Terry Mulligan
St. Cloud, Minnesota

▲ Pencil lines help you track your progress as you sand the stone.

▲ The pencil lines in the middle of the stone will typically be the last to disappear.



Adjustable Shop-Made Arc

Trying to bend a long, flexible strip and trace an arc at the same time can be tricky. To make it easier, I made an adjustable arc that can be locked into any curved shape I want. The arc is made from a strip of ¼" pegboard (about 24" long), a nylon string, and a cord lock that I bought at a fabric store.

EASY ASSEMBLY. First, cut the nylon string to twice the length of the pegboard strip and tie it to one end (main photo). Next, slip one end of the string through the cord lock and then loop that same end through two holes in the opposite end of the strip. Finish up by feeding the string back through the cord lock (inset photo).

ADJUST TO SIZE. To change the size of the arc, simply move the looped end of the string into a different set of holes in the pegboard strip and adjust the cord lock.

Frank Sand
Lincoln, Nebraska

▲ Position the jig against the band saw fence so that cutting the blank will yield two equally sized strips.

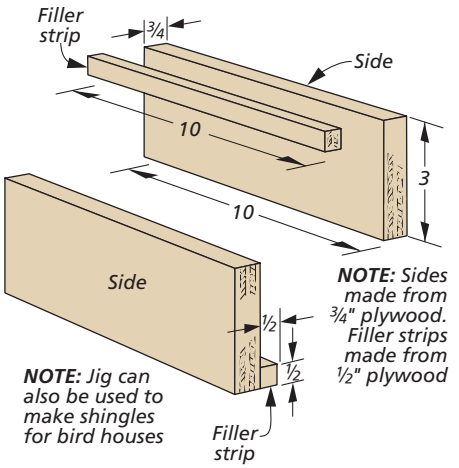
Band Saw Siding Jig

Building dollhouses is one of my favorite woodworking projects. But I was never quite comfortable making the clapboard siding on the table saw. The small, thin pieces that I needed to bevel rip for the siding blanks put my fingers too close to the spinning blade. To solve this problem, I designed this simple jig to use on my band saw.

BUILD IT. The jig is simply two plywood sides with a couple plywood filler strips glued to the inside face of each side. The opening created between the filler strips is sized to accommodate a rectangular blank that will yield two tapered siding "strips" when ripped in half.

USE IT. The setup couldn't be easier. Just tilt the band saw table to 5° and set the fence so the jig is positioned as shown in the inset photo above. Cut into the jig about ½" and clamp the jig to the fence. Now feed the blanks through the jig. Use another blank as a push stick to move the workpiece through the jig.

Bernie Arseneau
Whitefish, Ontario



QUICK TIPS

Sanding Mask. *Norm Mattson* of *Racine, Wisconsin*, builds a lot of furniture with recessed panels. One frustration he had was how to break the sharp edges of the stiles and rails after the panels were assembled without scratching the panels. His solution was to use a drywall taping knife to protect them.

Best Glue Bottles. *Bill Wells* of *Olympia, Washington*, was having trouble with the caps on his glue bottles plugging up after every use. His solution was to use empty hand sanitizer bottles for his glue. The caps have a plastic nib in the lid that seals the bottle and keeps the opening clear.

Swivel Storage Rack

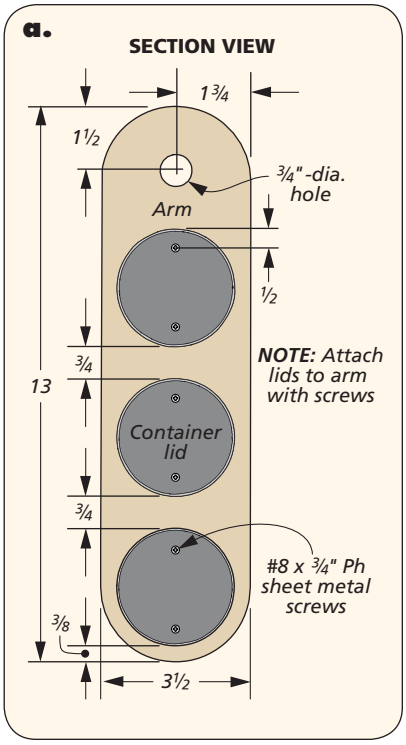
Like a lot of woodworkers, I have limited storage space in my small shop. So taking advantage of the space I do have is very important. This includes making practical use of every bit of available wall space. To that end, I came up with this swivel storage rack you see here.

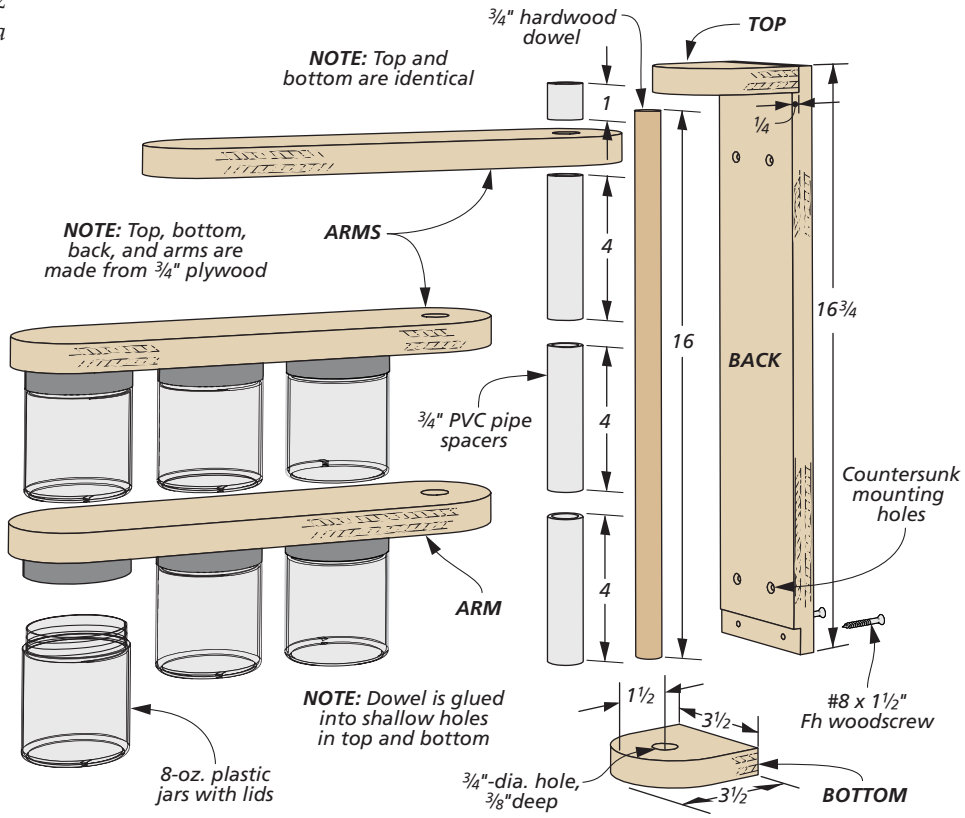
CONVENIENT DESIGN. At the heart of the storage rack are some 8-oz. clear plastic jars with screw-on lids. These jars are available online (Sources, page 67) and are the perfect size for organizing a vast array of small items and hardware.

SIMPLE BUILD. With the exception of the dowel and the PVC spacers, the storage rack parts are all made from plywood. I made the top, bottom, and back first. A shallow hole in the top and bottom holds the dowel, and a couple rabbets are needed at the ends of the back. Next, cut the arms to size. Drill a hole in each arm for the dowel to pass through and use a couple screws to secure three lids to the underside of each arm.

ASSEMBLE THE PARTS. Screw the bottom to the back first and glue one end of the dowel into the hole. Then it's just a matter of stacking the rest of the pieces in place, alternating between spacers and arms until you reach the short spacer at the top. Finally, secure the top to the back.

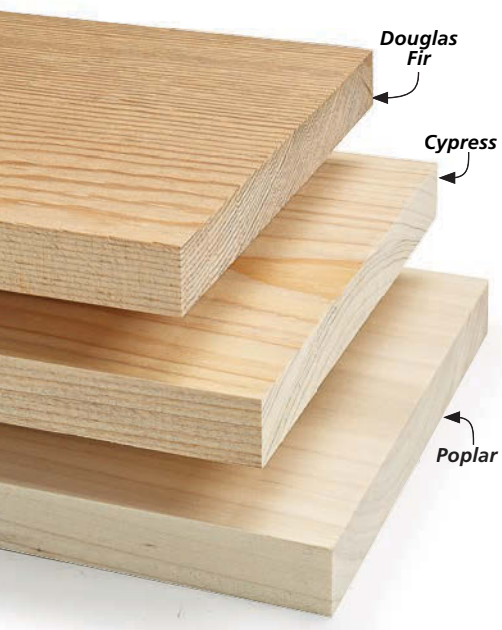
Ernie Perez
Key West, Florida





all about

working with Cypress



▲ Cypress is a relatively soft lumber, falling between Douglas fir and poplar lumber on the *Janka* hardness scale.

When choosing a wood for outdoor projects, the harsh elements that the project will have to endure are a primary consideration. After all, most outdoor furniture will, at one point or another, be exposed to rain, snow, and the damaging effects of the sun's rays. Not to mention the possibility of insect damage.

Many woodworkers lean towards using cedar, redwood, or maybe even white oak. All of these species have characteristics that make them ideal for outdoor use. But one often overlooked option that's just as rot and decay resistant is bald cypress (main photo above).

OVERVIEW. Depending on what part of the country you live in, bald cypress (*Taxodium distichum*) goes by many aliases, including red, yellow, southern, or swamp cypress. But most refer to it as just plain cypress. As the latter nicknames would suggest, cypress primarily grows in the southeastern United States around the bottomlands and swampy marshes that border the Gulf Coast and eastern seaboard.

WORKING PROPERTIES. Although technically classified as a needle-bearing conifer, cypress trees mimic deciduous hardwood trees by turning brown in the fall and dropping their needles. And like their deciduous counterparts, the lumber produced from the cypress tree is often grouped together with other hardwoods, even though it's really a softwood.

As shown in the photo at left, cypress falls between Douglas fir and poplar on the *Janka* hardness scale. Since cypress is rather soft, it is very easy to work using either hand tools or power tools. And board edges are a breeze to rout without fear of burning the wood.

DECAY-RESISTANT. Even though it's a softwood, cypress lumber is strong, lightweight, and stable. Plus, a naturally occurring preservative called cypressene is produced in cypress heartwood. This preservative in the wood is what makes it resistant to decay and insects. But despite this oil content, it maintains good gluing, nailing, and finishing properties (photo below).

OTHER USES IN WOODWORKING. In addition to the characteristics that make it suitable for outdoor use, cypress is also desirable for general woodworking applications. It has a pleasant appearance that makes it ideal for furniture building, cabinet-making, interior trim, paneling, flooring, and a host of other indoor applications.

Much like walnut lumber, cypress has a noticable contrast between the lighter-colored sap wood (often found along the edges of boards) and the darker heartwood. Because of this, it pays to take some extra time when selecting your boards for any fine woodworking projects to achieve a uniform appearance.

AVAILABILITY. If you live in the southern regions of the country, you'll find cypress readily available in lumberyards and home centers, much the same way pine can be found in many northern states. Even in northern locations, many specialty lumber dealers stock cypress. It can also be purchased on several websites and shipped right to your door. (Keep in mind that shipping charges can get rather expensive.)

▲ Pecky cypress lumber is easy to spot with its characteristic tunnels that are formed in living cypress trees.

UNIQUE VARIETIES. Some cypress trees can yield rather unusual offerings that are revealed when logs are milled into lumber. One of these distinctive variations is known as pecky cypress. Pecky cypress is characterized by the small tunnels that run with the grain of some cypress trees (photo, above).

These tunnels are caused by a fungus that sometimes attacks the heartwood of living cypress trees. When the trees are harvested, the fungus dies. The resulting tunnels that are exposed after being sawn into lumber are what give the lumber its name. This increasingly rare lumber is prized by furniture makers and builders alike.

For more information about suppliers of pecky cypress, turn to Sources on page 67. Be forewarned, however, some companies require a minimum order for their specialty woods. W

▲ Cypressene oil found in cypress lumber acts as a preservative and gives the wood its rot and decay resistance. Despite the presence of these oils, cypress maintains excellent gluing properties. Regular wood glue is all that's needed to form a strong joint.

A Closer Look: CYPRESS KNEES

Cypress trees are also known for another unusual characteristic: knees. No, they can't walk. But rather, this type of knee is a cone-shaped growth that is often found around the base of cypress trees growing in, or around, swampy ground.

As cypress trees growing in the swamps mature, extensions of the root system grow above the water or ground line forming these peculiar shapes. These root formations are very unique in that no two knees are the same.

So how are these useful to woodworkers? Well, cypress knees are quite soft. When dried, they're very easy to carve. And because of the distinctiveness of each knee, some people even display them in their natural state.

Photo: Manfred Mielke, USDA Forest Service, Bugwood.org

▲ Cypress knees (above) grow out of the root system of the cypress tree in swampy areas. The knees rise above the waterline making them easy to harvest.

fast, foolproof

Drawer Joints

Few drawer joints are stronger than a locking rabbet. The interlocking nature of the joint offers plenty of glue surface, as well as a mechanical connection. But if you've ever made one at the table saw, you know it can be a time-consuming, multi-step process to set up and cut.

Enter the drawer lock router bit, a bit that simplifies the process of cutting a locking rabbet joint. The bit cuts both the drawer fronts and backs, as well as the sides, all with a single height setting at your router table.

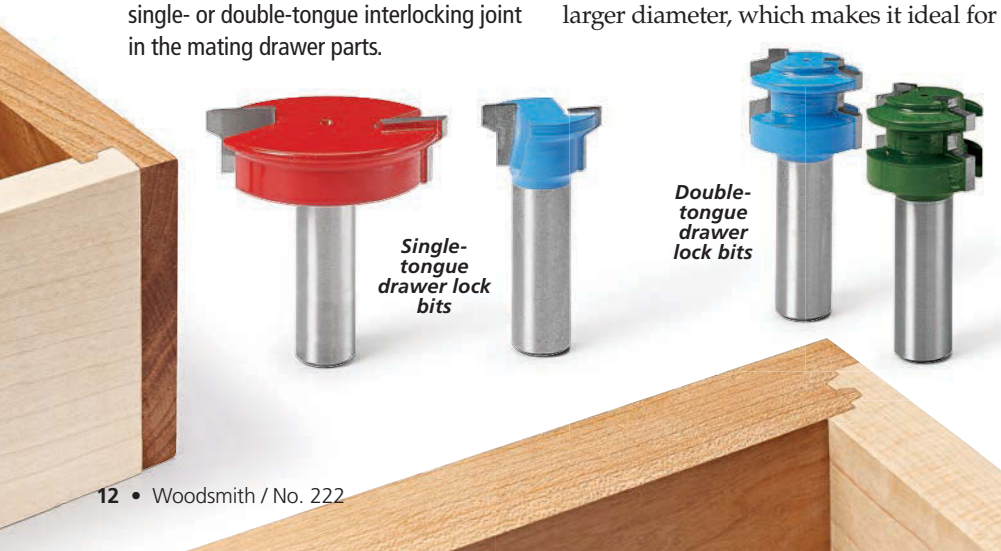
TYPES OF DRAWER LOCK BITS. As you can see below, drawer lock bits are available with different cutting profiles. The bits on the left feature the more conventional profile, which creates a single tongue and an interlocking joint in the fronts, backs, and sides. The red *Freud* bit has a larger diameter, which makes it ideal for deeper cuts such as lipped drawer fronts (refer to the box on the next page).

These types of bits are well-suited for cutting parts that are ½" to ¾" thick. Once you get the height of the bit established, you only have to adjust the router table fence to rout each half of the joint.

Both *Lee Valley* and *Rockler* have a variation on this design that features two tongues, as shown below right. This style of bit is better suited for cutting parts that are ¾" or thicker. One nice thing about this bit that you don't have to change the bit height or the fence setting once you get it set up properly. (Refer to page 67 for source information on all the bits.)

Regardless of which bit you choose, setting up and using the bits is easy. While both bits work well, I gravitate more toward the standard, single-tongue bit since it's well-suited for the types of drawers I usually build (¾" fronts with ½" sides). You can see the steps required to cut a joint with this bit in the photos and captions on the following page.

▼ Drawer lock bits are available to cut a single- or double-tongue interlocking joint in the mating drawer parts.



▲ Use a drawer side as a setup gauge for positioning the router table fence. The cutter should be flush with the outer face.

▲ As you pass the drawer front or back over the spinning bit, use a backer board to keep it square and prevent tearout.

▲ Now slide the fence forward, bringing the lower cutter in line with the fence in order to cut the mating drawer sides.

USING THE BITS. The first thing you want to do is cut your drawer parts to final size. While you're at it, make some extra parts to use as test pieces to fine-tune the router table setup. Once you have everything set up to cut a perfect joint, label and save those test pieces. They make great setup blocks later on.

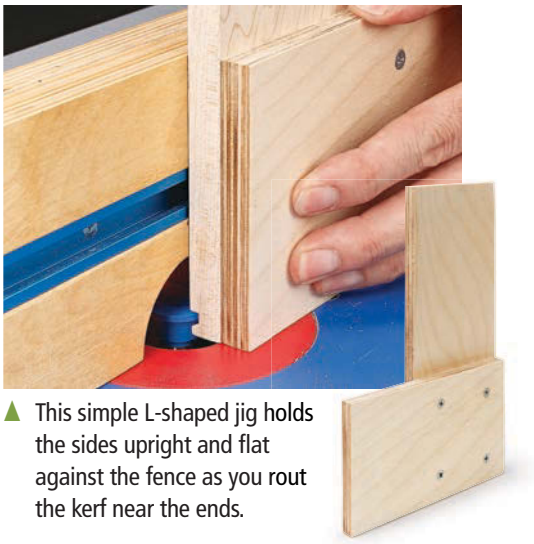
The first step in using the bit is to set the bit height. For ¾"-thick fronts and backs and ½"-thick sides, an initial bit height of ⅜" should work. The thing to remember is that once you establish the bit height, you leave it there for all the steps shown in the photos. After making your first set of test pieces, you may have to tweak the height of the bit. (More on this later.)

FRONTS & BACKS. With the bit height set, the next step is to position the fence to rout the drawer fronts and backs. To do this, I like to use one of the drawer sides as a gauge, as shown in the upper left photo. This creates a joint in the ends of the drawer fronts and backs that's flush with the outer faces of the sides. (For a lipped drawer front, you'll do things a little differently, refer to the box below.)

Once the bit height and fence position are established, you can rout the ends of the drawer front and back test pieces. Use a wide backer board to keep the workpiece perpendicular to the fence and to prevent tearout on the back edge (upper middle photo).

DRAWER SIDES. With the front and back test pieces complete, setting up to cut the mating sides is easy. You slide the fence forward to align it with the lower portion of the cutter. I use a steel rule to check this setting (upper right photo).

The only challenging aspect of making the sides is that you have to stand them on end while feeding them past the spinning router bit. To help support the sides while doing this, I made the simple jig you see above. It's just two scrap pieces that are formed into an L-shape. It holds the workpiece flat against the fence and square to the table. Apply firm pressure as you move the drawer side past the bit. It's not a hefty cut, so you won't meet much resistance here.



▲ This simple L-shaped jig holds the sides upright and flat against the fence as you rout the kerf near the ends.

TROUBLESHOOTING. Before cutting your actual drawer parts, take a look at the fit of your test pieces and make any necessary adjustments. For example, a gap in the joint can indicate that the bit is too low, while a joint that won't close means the bit is too high. And a side that's recessed behind the drawer front means the fence is set too far back, while a side that's proud of the drawer front means that the fence is set too far forward.

A BETTER LOCKING RABBET. After cutting a groove for the bottom panel, you'll have drawer parts with a seamless locking rabbet. Plus, it squares itself during assembly and adds a lot of strength. These bits have certainly earned a spot in my router bit cabinet for future projects that call for drawers. W

How-To: LIPPED DRAWER FRONTS

Some drawers feature a lipped front that overhangs the sides. This is often done to accommodate and hide drawer slides. And these drawer lock bits can handle this need easily, as well.

To make drawers with lipped fronts, I like to cut the joints in the back and sides first, as shown above. Then you can rout the ends of the drawer front, gradually adjusting the fence backward until you get a nice fit (photos at right).

► Creating a lipped drawer front is a matter of adjusting the fence between passes until reaching the desired cut.

great gear

accessories for Dust Collection

▲ This 10' hose assembly from *Woodcraft* will attach to the dust collection port on a wide variety of tools.

One of the downsides of woodworking is dealing with all of the sawdust that's generated. In my shop, the dust collector handles the large volumes of sawdust generated by stationary tools like the table saw and thickness planer.

The bigger challenge is collecting the dust created while using tools like drills, routers, and sanders. Getting a vacuum source close to or attached to these tools can be frustrating and cumbersome.

Fortunately, there are a number of inexpensive solutions to eliminate dust at the source. Some are designed to be attached directly to the 2¼"-dia. port found on shop vacuums. And with the right adapter, you can also attach them to your dust collection system. Find out where to get them in Sources on page 67.

AT THE DRILL PRESS. One of the messiest tools in the shop, and the most difficult for managing dust and chips, is the drill press. After drilling just a few holes, you have a pile of debris that gets in the way.

One newer product to address this problem is shown above. The *Drillnado* consists of a collar that fits around the quill of your drill press. A plastic bellows surrounds the drill bit to provide dust collection right at the source.

When I tried the *Drillnado*, I found it works great for twist and brad-point bits.

Out of the box, it handles bits up to about ¾" in diameter. (You can use larger bits by trimming the bottom end of the bellows.)

On some drill presses, the larger chips generated by Forstner-style bits can clog the *Drillnado's* dust port. I recommend you check the documentation on their web site to help you decide if it's a good fit for your drill press.

SMALL-PORT DUST COLLECTION. Other tools in the shop that generate a lot of chips and dust are sanders and pocket hole jigs. There are easy solutions for those tools that connect to your shop vacuum.

Woodcraft supplies a vacuum hose with a 1" I.D. x 1 3/16" (30mm) O.D. fitting at one end and a 1½" x 1¾" fitting at the opposite end. It fits a variety of tools, including the *Kreg* pocket hole jig (bottom photo on the previous page). You'll still need an adapter to fit the port on your shop vacuum (most ports are 2¼"-dia.).

Another great option for hooking up your tools to a shop vacuum is *Rockler's* small port hose kit shown at the top of the page. It includes a couple of soft silicone rubber fittings that attach to a wide range of dust port sizes on your tools. It includes a 2¼"-dia. adapter that connects the 15' hose to your shop vacuum.

FLEXIBLE OPTIONS. Some tools in the shop don't make dust collection an easy task. But a couple of product types allow you to configure an effective solution.

One system is the modular hose design by *Loc-Line* shown at right. It's a complete 2½" vacuum system with a wide range of fittings that snap onto the hose. And each section of the hose locks into place, so you can configure any length you need for the task at hand.

The small port hose kit from *Rockler* includes a 1" and 1½" dust port plus a 2¼" fitting that connects to a shop vacuum.

Loc-Line hoses and fittings are modular to enable a variety of configurations for dust collection right at the source.

RIGID HOSE. Several vendors offer a kit that includes a 2½"-dia. "rigid" flex hose. You can twist and turn it in any direction for optimal dust collection, and it will maintain that position. A couple of nozzles are included to gather dust at the source. Fittings make it easy to connect the hose to your shop vacuum (photos below). The wide nozzle is ideal for capturing sanding dust at the lathe.

JUST DO IT. Dust in the shop is not only messy, but it can also be a health concern. These solutions make it easier to keep the air clear in your workshop. W

The hose on this dust collection accessory is adjustable, allowing it to be positioned wherever needed. Plus, it holds its position so you can concentrate on the task at hand.

perfect parts with Pattern Sawing

Whenever a project calls for making several identically shaped parts, I immediately start thinking of ways to streamline the process. One of my favorite tricks to make multiple, identical parts is to use a pattern, or template.

Long story short, you trace the template on each workpiece blank and cut away most of the waste (often with a band saw). Then it's a simple matter to use the template to guide a flush trim bit in a router to create an exact copy.

One of the sticking points with this method is rough cutting the waste. The idea is to remove as much of the waste as possible. I aim for no more than 1/16" of waste outside the layout line.

Leaving a small amount of waste to trim away speeds up the flush trimming step. It also reduces the possibility of the edge of the workpiece tearing out.

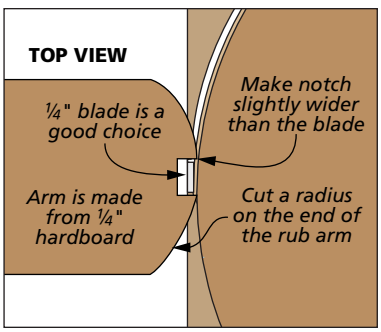
However, making "precise" rough cuts with a band saw is time-consuming and you run the risk of cutting across the line.

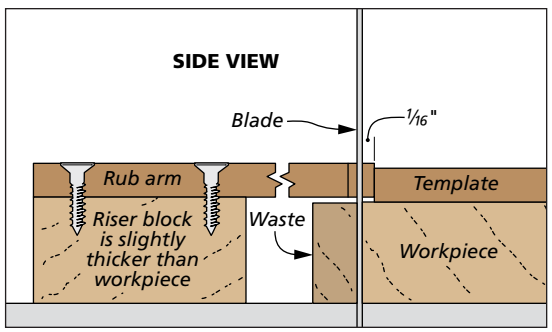
The answer to that is to put your template to work in a different way — guiding your band saw. The trick is creating a way for the band saw blade to follow the template while leaving a consistent, small amount of waste.

For that I use a rub arm, as shown in the photo above. It acts somewhat like a guide bushing on a router. The blade is recessed in the rub arm. You pass the workpiece through the blade keeping the template in contact with the rub arm creating an even reveal of waste.

RUB ARM DETAILS. There are a few important considerations when making the rub arm to get the best results. One of the first details is the overall size and shape. The end of the rub arm is curved so it can follow the tightest curve in your template. Like the template, I made the rub arm from 1/4" hardboard.

BLADE NOTCH. In order to leave a small amount of waste, the blade has to be



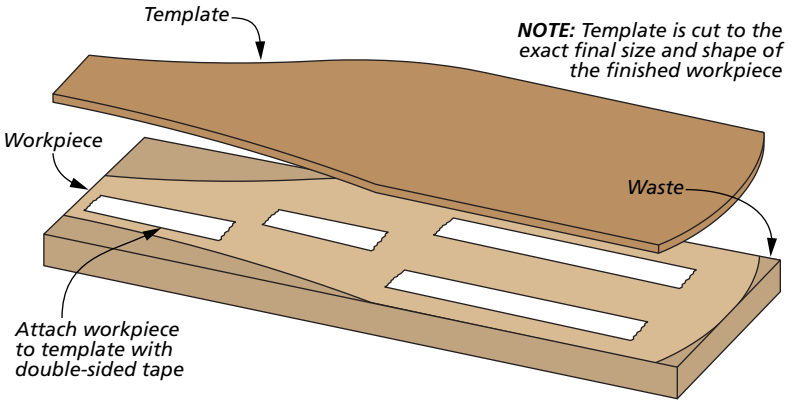


offset from the end of the rub arm. A notch on the end of the arm accepts the blade. It should be sized so it's a hair larger than the width of the blade. Speaking of the blade, I find that a ¼" blade is a good all-around choice for cutting most curved shapes.

Cut the notch deep enough so that you can recess the blade 1/16" in from the end of the arm. This is shown in the lower left drawing on the previous page.

SETTING UP THE RUB ARM. In order to maximize visibility and control, I like to work with the template on the top face of the workpiece. So the rub arm needs to be suspended above the saw table so that it contacts the edge of the template. To accomplish this, the rub arm is attached to a riser block that's slightly thicker than the workpiece, as in the lower right drawing on the previous page.

In addition to elevating the rub arm, you need to include clearance between the end of the arm and the riser block for the waste portion of the blank to pass through without catching. The block (and rub arm) is clamped to the side of the saw table, as shown in the main photo on the previous page. When preparing your workpiece, it's a good idea to size the blank to minimize the amount of waste that needs to be removed.



MAKING CUTS

If you've only cut curves freehand with a band saw, using a template and rub arm will seem unfamiliar at first. The truth is you get the hang of it pretty quickly. The real key in the process is keeping the edge of the template in contact with the two points of the rub arm on either side of the blade. The way to do this lies in your stance and how you position your hands.

YOUR STANCE. Unless the workpiece is long, I prefer to stand a little to the side of the band saw rather than directly in front of it. This location gives me a better view of the rub arm while monitoring the progress of the cut.

Use your left hand to move the workpiece through the blade left to right. The other hand provides side-to-side steering that keeps the template in constant contact with the rub arm, as you can see in the main photo.

TAKE IT EASY. Feed the workpiece at a steady rate allowing the band saw and blade to do the work of cutting. The blade will have a natural cutting pace that you'll pick up on in a short time.

How quickly you can make the cut depends on the density of the workpiece and the sharpness of the blade. You should feel mild resistance as you feed the workpiece into the blade.

Feeding the workpiece with too much pressure may cause the blade to distort, flexing either backwards or to the side which could spoil the template and workpiece. With a little practice, this will become second nature.

When you've completed a cut, the edge of the workpiece should look like what you see in the lower left photo. The blank will be slightly larger than the template and have telltale blade marks.

FLUSH TRIM. A quick stop at the router table is the last step (lower right photo). Here's where you can see the benefit of sawing with a template. With only a small amount of waste, you can work your way around the template and end up with a perfect project part.

Templates simplify the process of making shaped parts. And adding your band saw to the mix is a great way to improve the consistency of your work. W

▲ As you cut, steer the workpiece to keep the template in contact with the two points on the end of the rub arm. The result is a thin, even amount of waste that can be easily trimmed away.

▲ Leave the template in place and head over to the router table to clean up the workpiece. Set a flush-trim bit so that the bearing follows along the template to create a smooth, even edge.

Weekend Project

wall-hanging Display Shelf

Create a home for all of your treasures with this easy-to-build shelf unit. The adjustable shelves make customizing the arrangement a breeze.

Not all woodworking projects have to take center stage. This wall-mounted shelf is a good example. Whether you want to showcase a prized collection or an assortment of souvenirs gathered from family vacations, this shelf has things covered. Its subtle styling allows you to display cherished items without stealing the show. And the best part is that it can easily be built in a weekend.

DESIGN DETAILS. What makes this wall shelf so quick to build is its simple design. The whole unit is nothing more than an inner case held together with rabbets, dadoes, and screws and wrapped in an outer frame. A groove formed at the back edges of the frame parts creates a unique "invisible" mounting system.

SHELVES. Also, there are only two shelf sizes to make. Each of the shelves has narrow slots routed on the ends that slip over shelf pins. This allows you to change the layout quickly to accommodate various sizes of items.

MATERIALS. The display shelf can be made from just about any type of lumber. Since I planned on painting my finished shelf, I used poplar. It takes paint well, and it saved me a few bucks.

INNER CASE

The best way to tackle this project is to begin with the inner case and work your way out. To that end, I started by cutting the top, bottom, and vertical dividers to finished size. All of the dimensions

are shown at right. Take special care to make sure that the vertical dividers are all the same length, as well as the top and bottom. This ensures that the shelves fit properly later on.

DADOES & RABBETS. The vertical dividers fit into dadoes and rabbets cut into the inside face of the top and bottom pieces. And just like it was important to cut the vertical dividers (and the top and bottom) to the same length, it's also critical that the spacing between the vertical dividers is exactly the same. So take your time doing this layout work.

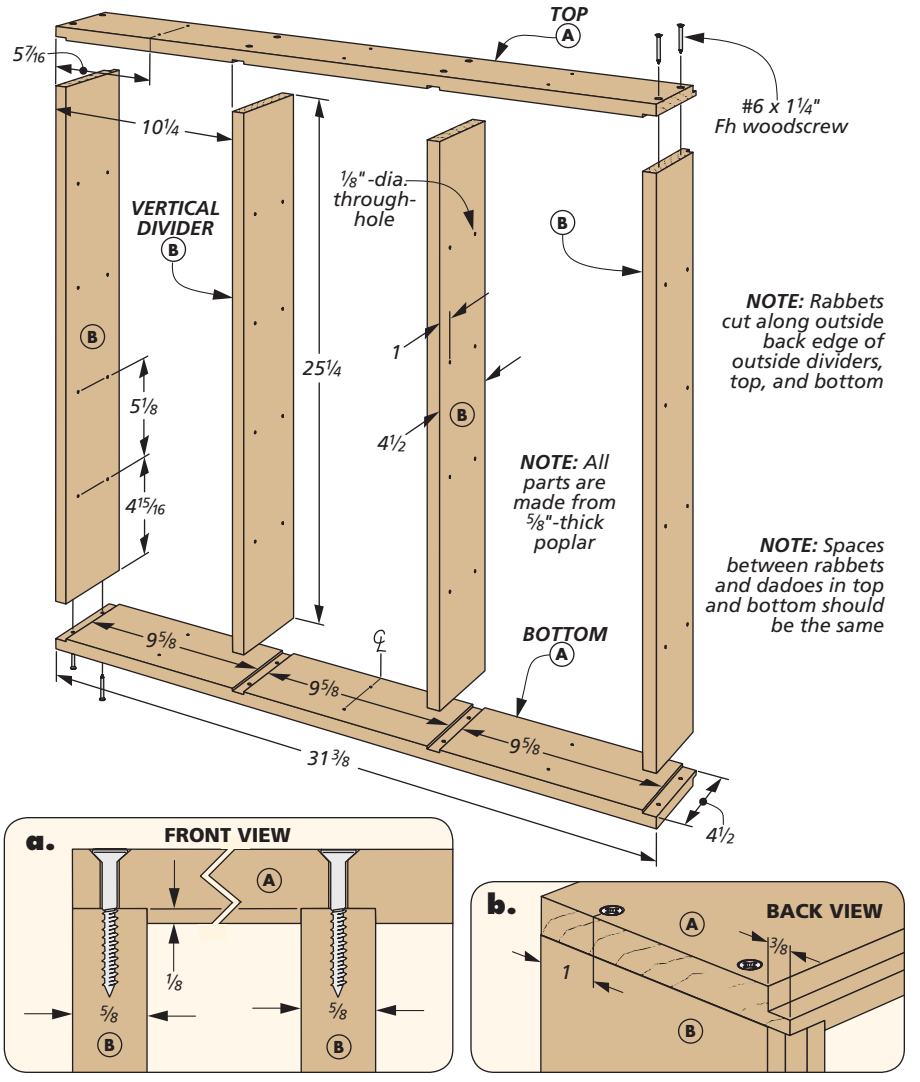
Since all of these interior case parts are made from 5/8"-thick stock, be careful setting up the dado blade so you get a nice tight fit. It may be necessary to use a shim or two in the dado stack. Figure 1 below shows the process for making these cuts at the table saw.

GROOVES. As I mentioned before, this shelf unit has a unique mounting sytem that keeps all wall fasteners out of sight. The first part of this approach is to cut a rabbet along the back edge of the top, bottom, and outside dividers.

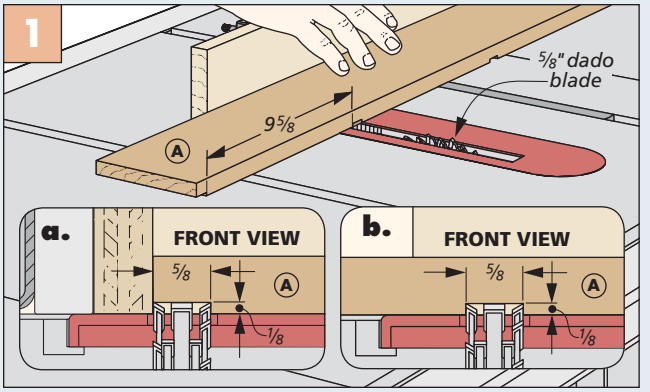
What might be a little different from what you're used to is that the rabbets are cut on the outside face of each workpiece. Don't worry about these rabbets being visible, as they'll be covered by the outer frame pieces eventually. Look at Figure 2 below to see how to make these rabbets.

SHELF PIN HOLES. Since the inner case is wrapped with an outer frame, the shelf pin holes can be drilled through the pieces. Lay out the shelf pin positions on one vertical divider and the top or bottom piece. Stack the dividers together and drill all of the holes at once (Figure 3, below). Do the same for the top and bottom workpieces.

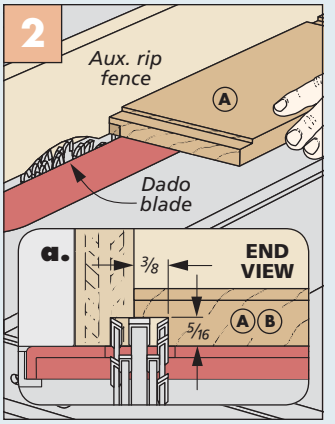
ASSEMBLY TIME. Dry-assemble the case and drill holes in the top and bottom for screws. (See detail 'a' for positioning.) Then add some glue to the dadoes and rabbets and screw the assembly together.



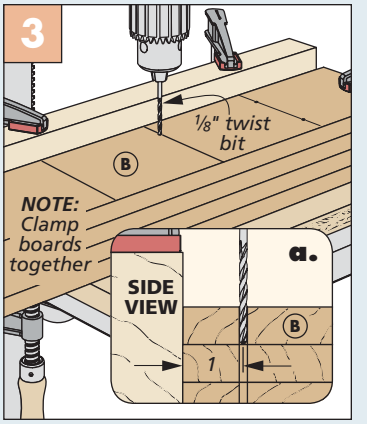
How-To: MAKE THE INNER CASE



Dadoes & Rabbets. The dadoes and rabbets cut in the top and bottom pieces require precise layout to ensure proper spacing between the vertical dividers.



Long Rabbets. Bury the dado blade in an auxiliary fence to cut these rabbets.



Drilling. Clamp the dividers together to make quick work of drilling the holes.

A mitered **OUTER FRAME**

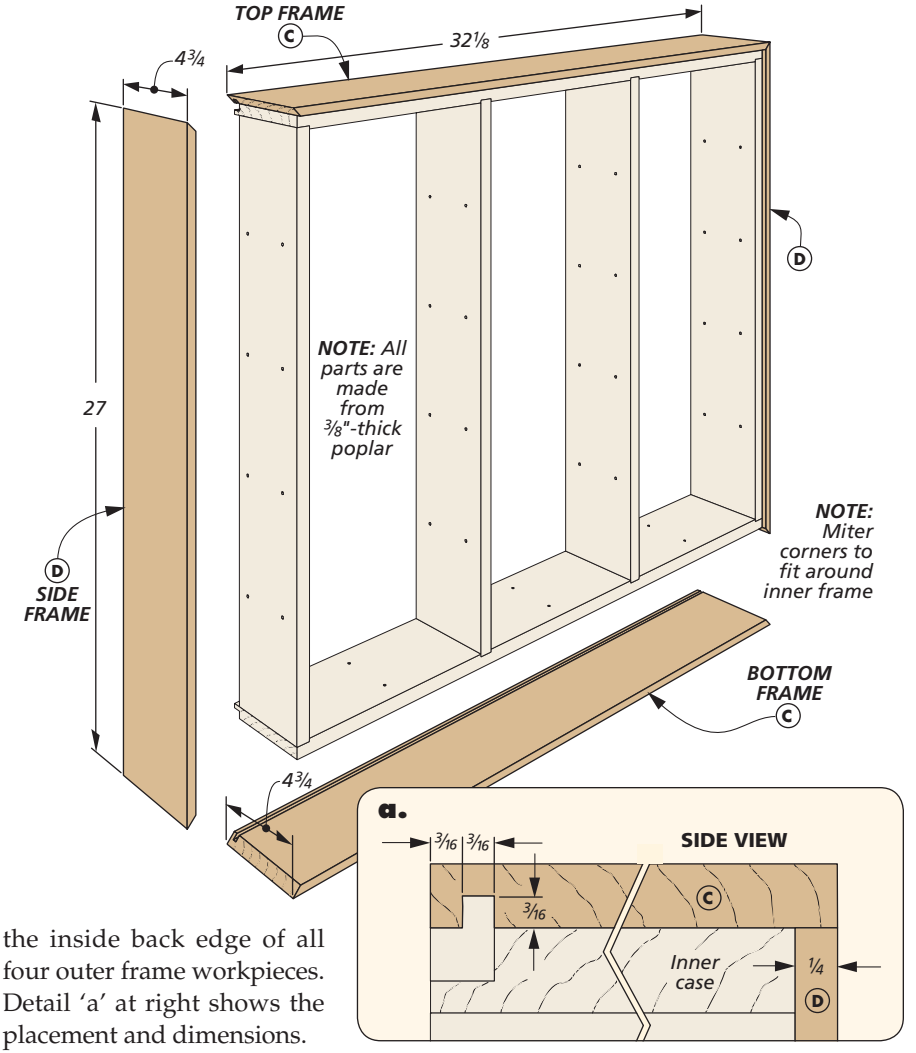
Since glue and screws are used to hold the inner case together, you're able to move right along and start working on the outer frame and a set of adjustable shelves. I began work on the thinner, outer frame first.

OUTER FRAME. The four parts that make up the outer frame are ⅜"-thick. Since the poplar I used is relatively inexpensive, I just planed ¾"-thick stock down to final thickness. But you could also choose thicker boards and then resaw and plane them to thickness.

With the boards at proper thickness, cut the top, bottom, and side pieces to size. You'll want to leave them a little long at this point to allow for mitering the corners later on. But first, there's one more operation to perform on these parts that will complete the hidden mounting system.

NARROW GROOVE. The illustration below shows how the wall-mounting system works. When the outer frame parts are glued around the inner case, an L-shaped channel is created. This provides room for a washer-head screw. With just a couple of screws secured to wall studs, the shelf unit is easy to hang. Plus, you can adjust the position without a lot of fuss. This also makes it easy to hang the shelf in either a portrait or landscape orientation.

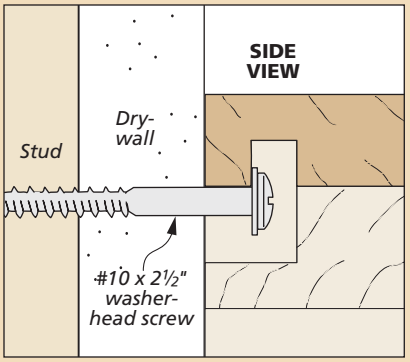
After installing a narrow dado blade in the table saw, cut the groove along the inside back edge of all four outer frame workpieces. Detail 'a' at right shows the placement and dimensions.



MITERED ENDS. To wrap the outer frame around the case, miter one end of the top piece and the mating end of one side piece. Hold these pieces tightly in position against the inner case and mark the opposite ends. Work your way around the case until all of the miters are cut.

Now glue and clamp the four outer frame pieces to the inner case. The back edges of the outer frame should be flush with the back edge of the inner case, but the front edges of the outer frame pieces should be ¼" proud of the inner case (detail 'a', above).

How-To: HANG IT



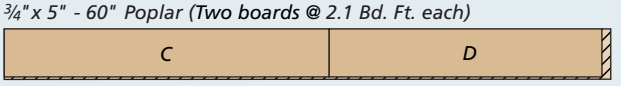
Mounting Slot. Secure the screws to wall studs and slip the display shelf over the screw heads.

Materials, Supplies & Cutting Diagram

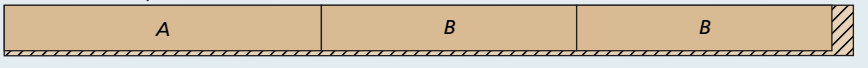
A	Top/Bottom (2)	⅝ x 4½ - 31⅜
B	Vertical Dividers (4)	⅝ x 4½ - 25¼
C	Top/Bottom Frames (2)	⅜ x 4¾ - 32⅛
D	Side Frames (2)	⅜ x 4¾ - 27
E	Long Shelves (11)	⅝ x 4½ - 9⅝
F	Short Shelves (5)	⅝ x 4½ - 4½

- (16) #6 x 1¼" Fh Woodscrews
- (72) 3mm to 5mm Shelf Pins

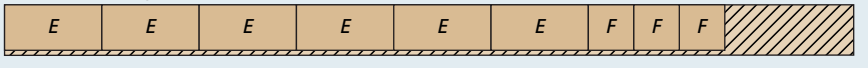
¾"x 5" - 60" Poplar (Two boards @ 2.1 Bd. Ft. each)



¾"x 5" - 84" Poplar (Two boards @ 2.9 Bd. Ft. each)



¾"x 5" - 84" Poplar (Two boards @ 2.9 Bd. Ft. each)



BUILD THE SHELVES

The long and short shelves are all that's left to complete this project. The shelves can be placed in several arrangements to fit your display items, as shown at right. They're also designed so they'll easily slip in and out of position on small shelf pins. A narrow slot cut along the end of each shelf allows them to ride on the shelf pins (details 'b' and 'c', at right).

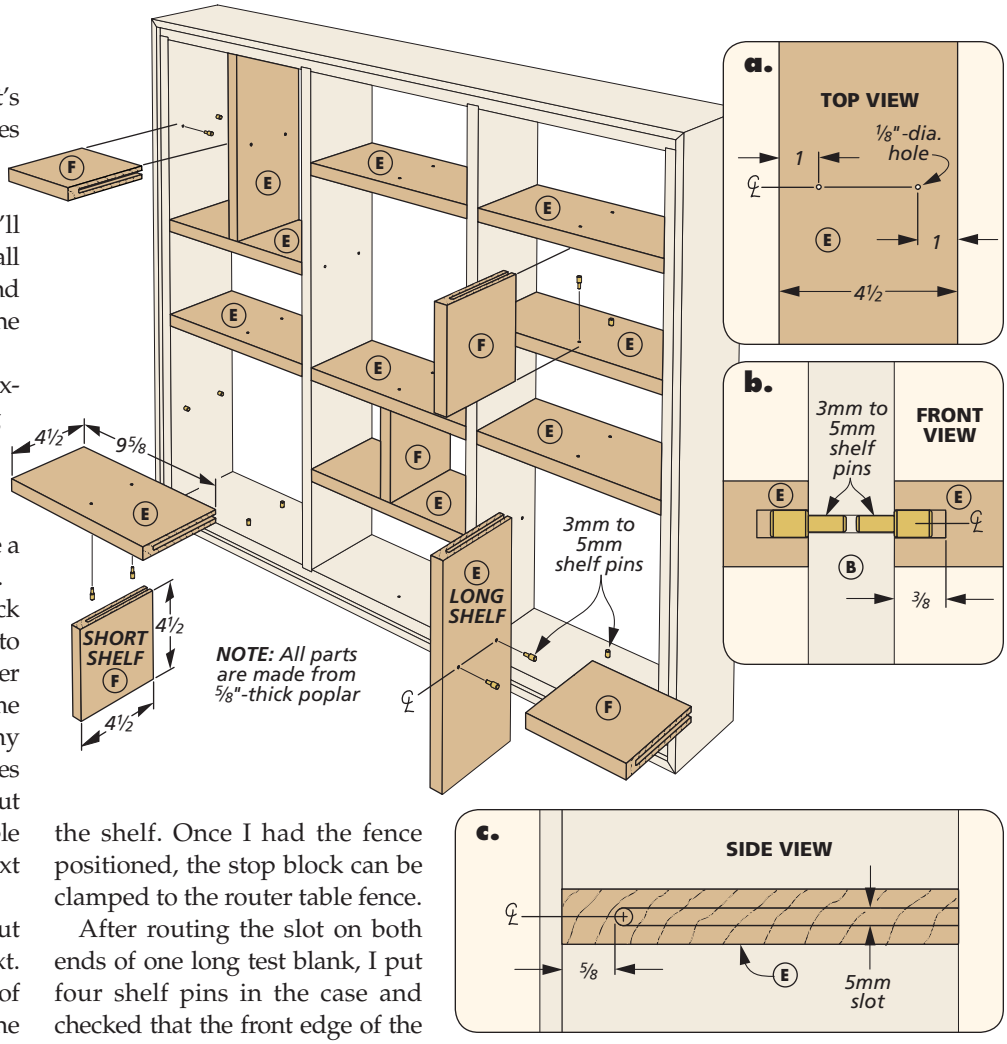
For the individual shelves, I made sixteen total. This consists of eleven long shelves and five short shelves. Depending on the configuration you decide on, you may not need to use all of them. But it's a good idea to make a full set now to allow for future changes.

SIZE THE SHELVES. With all of the shelf stock ripped to width, I cut the long shelves to length at the table saw using the miter gauge. To ensure each one was the same length, I used a stop block clamped to my miter gauge fence. Once the long shelves are done, adjust the stop block and cut the short shelves to length. I cut a couple extra of each size for setting up the next procedure at the router table.

ROUT THE SLOTS. The stopped slots cut in both ends of each shelf are up next. A 5mm straight bit matches the head of the pin to create a snug-fitting slot. The shelf pins and router bit are shown in the lower right photo.

The setup I used for making the stopped slots in the shelves is shown below. I cut a test piece to check that the slot was centered on the edge of the shelf. Once I had the fence positioned, the stop block can be clamped to the router table fence.

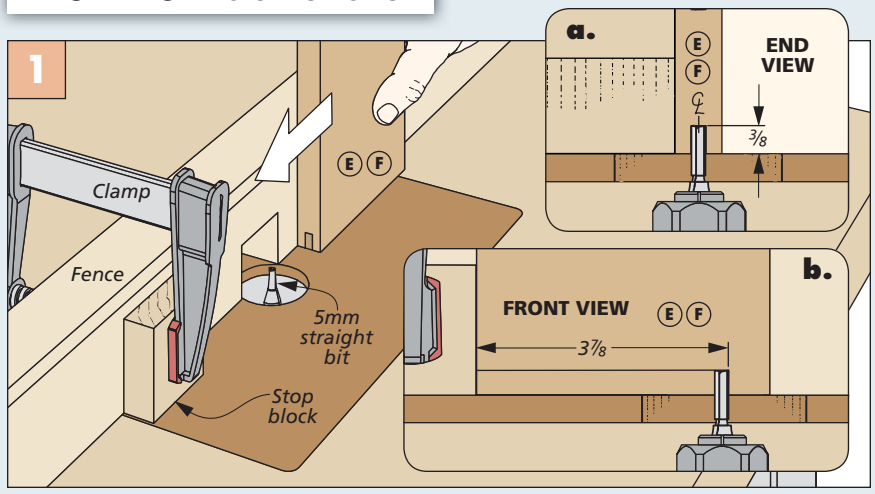
After routing the slot on both ends of one long test blank, I put four shelf pins in the case and checked that the front edge of the shelf was flush with the front edge of the inner case. If the test shelf extends beyond the front edge, adjust the stop block to make the slots a little longer. With everything dialed in, rout all of the slots on the ends of the remaining shelves.



DRILL SHELF PIN HOLES. In order for the short shelves to fit between the long shelves, a couple more shelf pin holes are needed in the center of each long shelf (detail 'a' above). I used the same technique to drill these holes that I did for the inner sides and dividers by clamping four shelves together and drilling all the holes at once.

Selecting a finish is all that's left. To see the paint I used, check Sources on page 67. After that, locate a couple of screws, and this shelf is ready to hang. W

How-To: ROUT SLOTS



Routing Shelf End Slots. Position the router fence to center the slot on the shelf end (detail 'a'). A stop block controls the length of the slot (detail 'b').

▲ A 5mm straight router bit creates the slot in the shelf ends. The shelves should fit snugly over the shelf pins.

Shop Project

Heirloom Brass Compass

Sharpen your shop skills by making this custom designed layout tool. You'll even learn simple techniques for working with brass along the way.

Every once in a while, I like to expand my horizons when it comes to shop projects. This compass is the perfect example. Made entirely from brass and steel, this layout tool is sure to be the perfect addition to any shop. Plus, you'll pick up some new skills by working with materials you may not often use.

If the thought of working with brass and steel seems a little intimidating, don't worry. There's really not a whole lot of difference from working with wood. The metals I selected for this project are easily machinable with common woodworking tools you probably already have in your shop.

The brass can be cut on a band saw with a standard wood-cutting blade. (I used a 3/16" blade with 10-tpi.) A hacksaw works well to cut the steel. Some files and a stationary disc sander are great for cleaning up the cut edges.

The only real difference to working with metals is that instead of using glue to hold parts together, you'll use solder. If you've ever sweated a copper pipe fitting, you'll find the process much the same. There are just a few "specialty" items you'll need (photo at left). I'll talk more about the soldering procedure in a bit.

CUTTING THE PARTS

You'll find a full-size pattern for the six main parts of the compass on page 25. The patterns can be copied, cut out, and glued to the flat brass stock with a little spray adhesive. (The tip of the pivot leg is glued to a steel blank.) As shown in Figure 1 on the next page, you'll then move

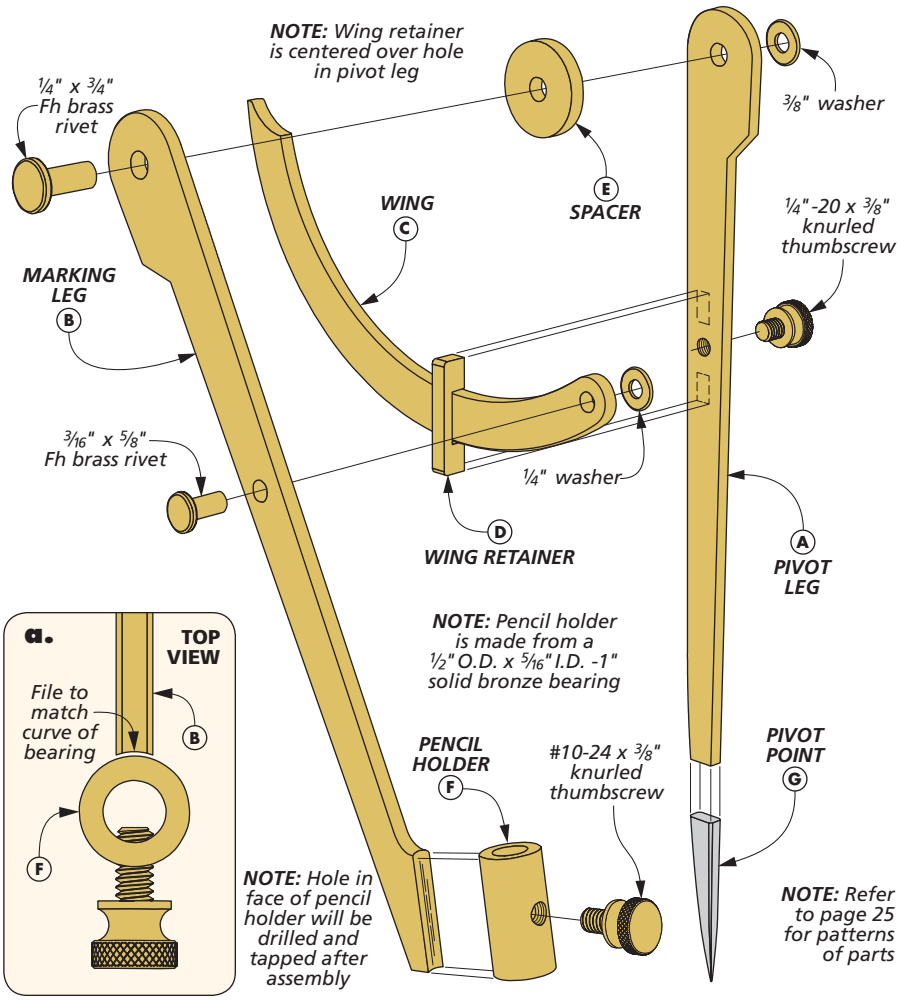
to the band saw to cut out the parts. Take your time with this process. The closer you get to the layout lines, the less filing and sanding you'll need to do later on.

And one more note about cutting these parts: You'll want to leave the bottom of the pivot leg a little wide for now. The final shaping will be done after the pivot point is soldered in place. (The same applies to the upper end of the steel point.)

FILE & SAND. After cutting out the parts, now is the time to break out the files and sanding supplies. For the areas that require quite a bit of material removal, I started with a coarse file and transitioned to a smooth file before switching to sandpaper. A three-sided taper file and a round file are also useful tools to have on hand. In addition, a combination disc and belt sander makes quick work of smoothing the edges. For the wing, I installed a sanding drum in my drill press.

The marking leg of the compass will eventually have a bronze bearing soldered to the flat area near the bottom of the leg. This bearing is the pencil holder. I used a round file to make a shallow, concave depression on the leg to match the shape of the bearing (detail 'a', at right).

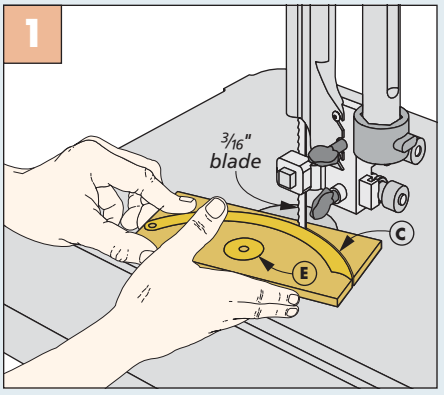
LAY OUT & DRILL HOLES. With the main parts of the compass in shape and sanded smooth, some holes are needed in a few of the parts for assembly and operation. (Refer to the patterns on page 25 for sizes and locations.) All of these holes are easy to make at the drill press (Figure 2, below). Don't forget the hole in the spacer and the wing, as well.



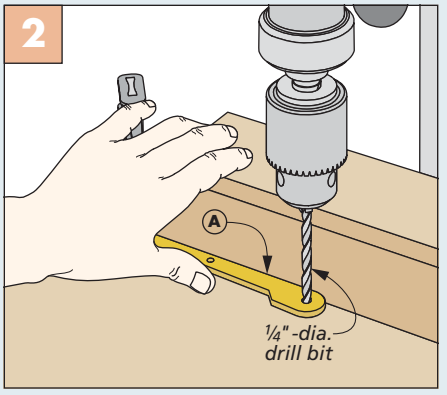
TAP THE LOWER HOLE. The lower hole in the pivot leg houses a knurled thumbscrew. The thumbscrew locks the wing in place against the retainer while in use. Use the proper size tap to cut threads in this hole as shown in Figure 3, below.

At this point, all of the parts needed to make the compass are cut to shape with the edges filed and sanded smooth. Turn to the next page where you'll start putting some heat to the project and bringing things together.

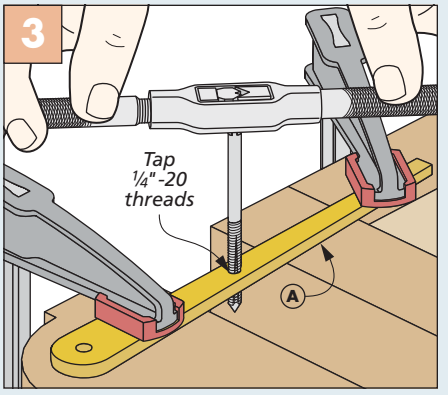
How-To: CUT & SHAPE BRASS PARTS



Cut out the Parts. A wood-cutting blade in the band saw slices through the machinable brass with ease.



Drill Multiple Holes. Lay out and drill all of the holes in the pivot and marking legs, as well as the wing.



Tap Hole in Pivot Leg. The lower hole of the pivot leg needs threads to accommodate a thumbscrew.

Solder & shape **BRASS & STEEL**

▲ A pair of vise grips help hold the marking leg at the correct angle while you solder it to the bronze bearing. A couple of fire bricks protect the work surface.

Now the process will start to feel a little bit like a science experiment. As you can see from the photos on this page, there are three components that need to be joined together using a soldering process. More specifically, you'll be using a silver-soldering method (also called silver-brazing). This simply means that the solder has a high silver content and melts at a higher temperature than regular solder, thus creating a very strong joint. This method is needed because of the thickness of the parts being used.

Sources on page 67 has the information on where you can find the items you'll need for silver-soldering. In addition to the solder, you'll need to pick up a flux that is specifically made for use with silver solder.

Also, because of the higher melting temperature of the silver solder, a bottle of *MAPP* gas (also called *MAP-Pro*) is needed. For safety reasons, I would recommend getting a torch head with a trigger start. This style ignites by squeezing the trigger, and more important, extinguishes when the trigger is released.

BRING THE HEAT. With all of the supplies gathered, you can now prepare the parts for silver-soldering. The key to a strong joint lies in four simple steps. First, make sure you have tight-fitting joints between the parts to be soldered. While the solder will fill a slight gap, anything wider than about the thickness

How-To: SOLDER PARTS & ADD FINAL DETAILS

Wing Retainer. The wing retainer is soldered in place first. It sits on the pivot leg so no clamps are required.

Add the Steel Tip. With the parts butted against each other, solder the steel tip to the end of the pivot leg.

Shape the Point. After everything has cooled, use a file to do the final shaping where the steel tip meets the pivot leg.

Sand the Parts. A piece of adhesive-backed sandpaper on a flat board provides a good surface for sanding.

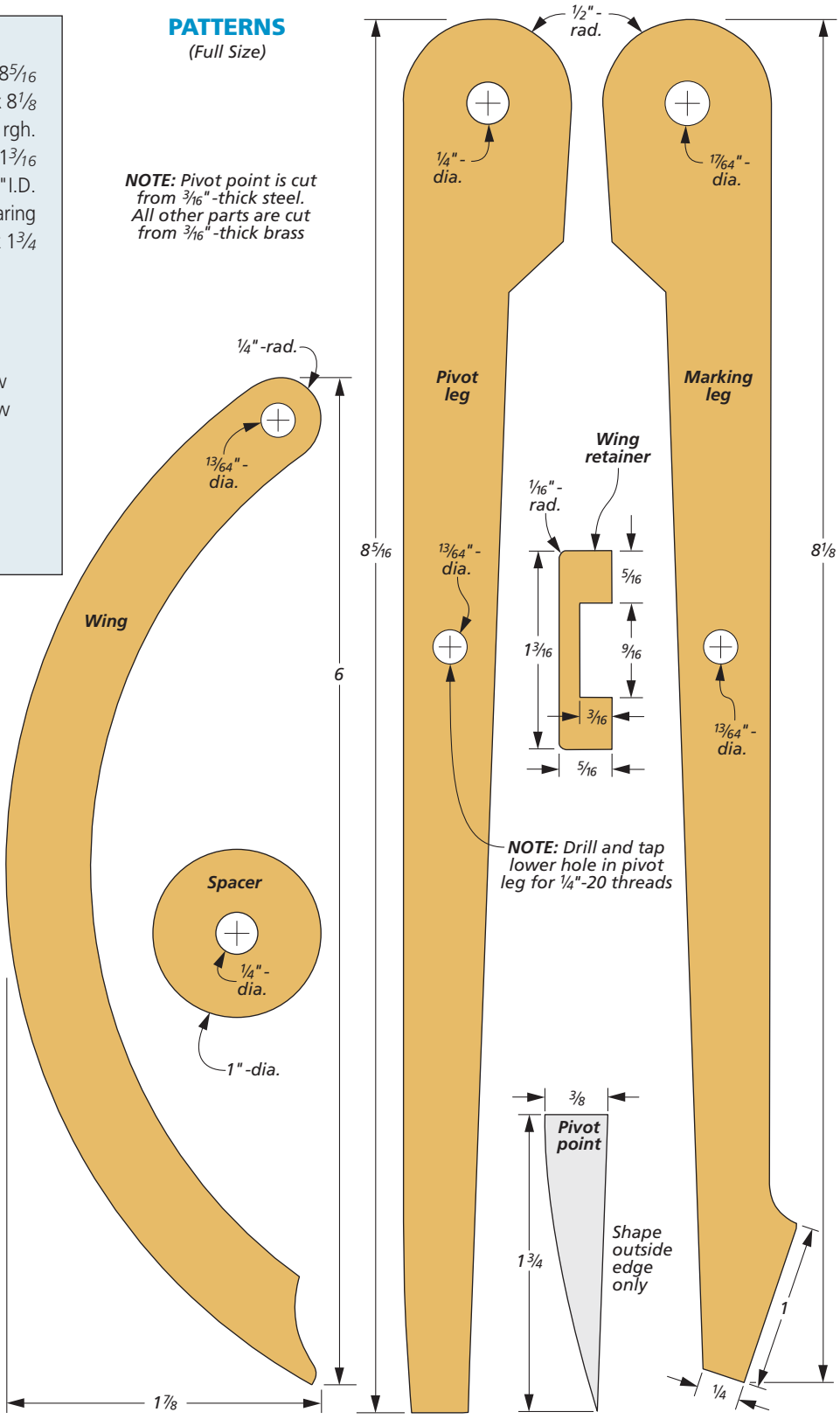
Drill & Tap. After drilling a hole in the side of the pencil holder, use the proper size tap to cut the threads.

Peen Rivet over Washer. Gently peen the soft rivet over the face of the washer to secure the legs together.

Materials & Supplies

A	Pivot Leg (1)	3/16" brass - 1 x 8 5/16
B	Marking Leg (1)	3/16" brass - 1 x 8 1/8
C	Wing (1)	3/16" brass - 2 x 6 rgh.
D	Wing Retainer (1)	3/16" brass - 5/16 x 1 3/16
E	Spacer (1)	3/16" brass - 1" O.D. x 1/4" I.D.
F	Pencil Hldr. (1)	1/2" O.D. x 5/16" I.D. - 1" bearing
G	Pivot Point (1)	3/16" O1 steel - 3/8 x 1 3/4

- (1) 3/16" x 1" - 24" Machinable 360 Brass
- (1) 3/16" x 2" - 6" Machinable 360 Brass
- (1) 3/16" x 1" - 6" O1 Tool Steel
- (1) 1/2" O.D. x 5/16" I.D. - 1" Bronze Bearing
- (1) 1/4"-20 x 3/8"-dia. Knurled Thumbscrew
- (1) #10-24 x 3/8"-dia. Knurled Thumbscrew
- (1) 1/4"-dia. x 3/4"-long Brass Fh Rivet
- (1) 3/16"-dia. x **5/8"**-long Brass Fh Rivet
- (1) 1/4" Brass Washer
- (1) **3/16"** Brass Washer
- (1) Brass Colored Solder - 6 Ft.



of a playing card could result in a weak joint. Second, clean the parts of dirt and oils. Sandpaper does a great job for this.

Third, immediately after the parts are cleaned they should be coated with flux. The flux further cleans the metal and prevents oxides from forming while the soldering takes place. And finally, apply plenty of heat and be patient. The idea is to get the metal hot enough so it (and not the flame) melts the solder. The hot metal will pull the solder into the joint by capillary action.

Start by joining the wing retainer and steel tip to the pivot leg. The bronze bearing (pencil holder) then gets attached to the marking leg (Main photo and Photos 1 and 2, previous page.)

FINAL SHAPING & CLEAN UP. After everything has cooled, you can complete the final shaping of the pivot leg where the steel tip meets the brass. A file and vise works well for this, as shown in Photo 3 on the previous page.

The parts will also be discolored and unattractive after the soldering process. But with a little elbow grease they'll clean right up. I used a piece of adhesive-backed sandpaper on a flat surface to brighten the brass and give the parts a consistent scratch pattern. Working up to 400-grit gave the parts a nice look.

All that's left before the compass can be assembled is to drill and tap a hole on the pencil holder for a thumbscrew. This is the same process you used on the pivot leg earlier (Photo 5).

ASSEMBLY TIME. A brass rivet holds the compass together. Sandwich the spacer between the marking leg and the pivot leg. Put the rivet through the hole and place a brass washer on the other end of the rivet. Gently peen the end of the rivet over the washer, ensuring the parts still move freely (Photo 6, previous page). Attach the wing to the marking leg in a similar fashion (no spacer this time).

Finally, insert a pencil in the pencil holder and secure it with the thumbscrew. This quality tool is now ready to go to work in the shop. W

Designer Project

Coastal Boat Bookcase

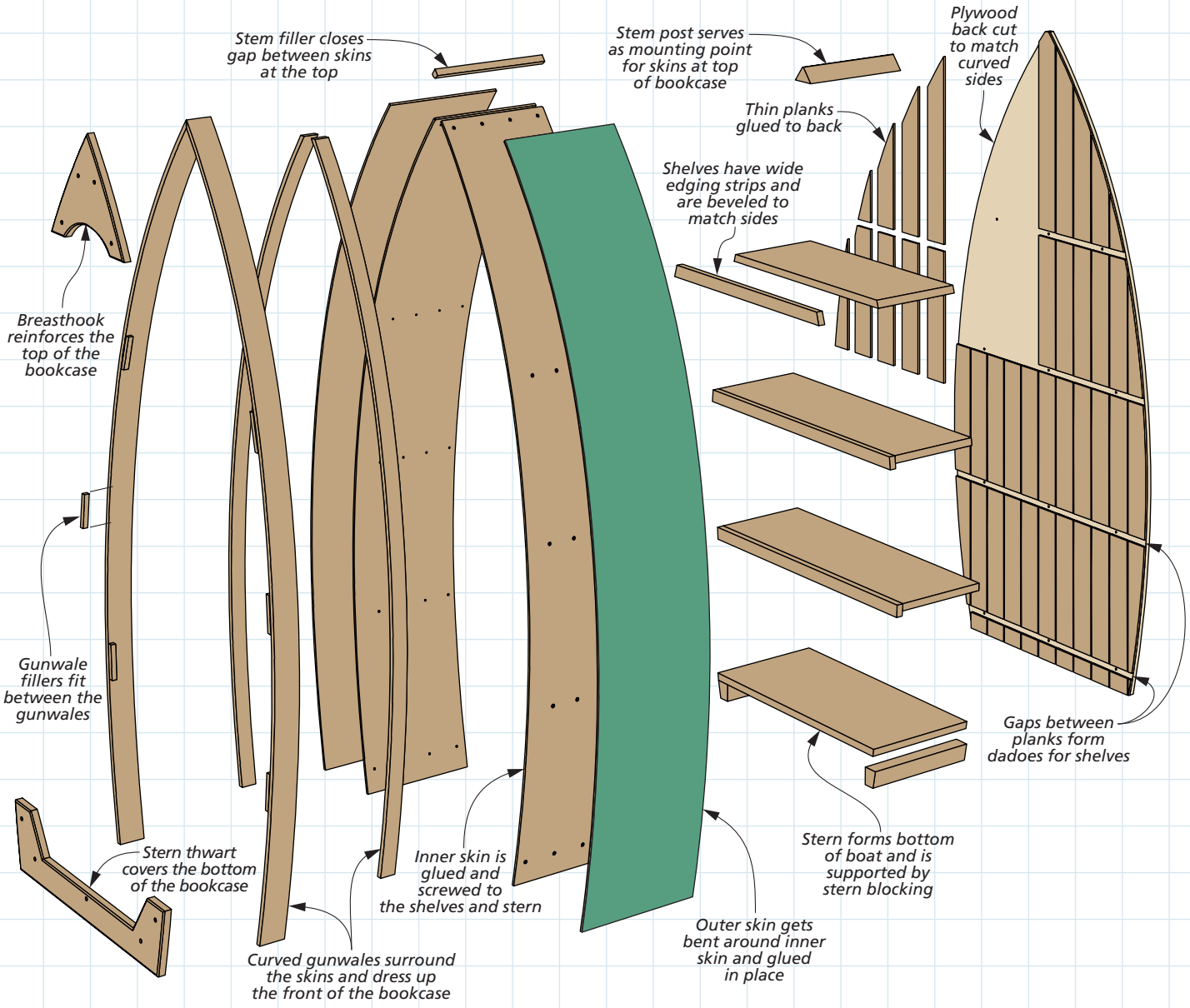
This project certainly isn't your average bookcase. But with a unique design, it's fun to build and sure to be a conversation piece in your home.

A number of bookcases have appeared in *Woodsmith* over the years that have been big, small, and everything in between. But none of those have been quite like this one. This unique take on a bookcase takes its inspiration from a rowboat to give you a completely different approach to a classic woodworking project. It's sure to be a fun addition to a kids' room or any other room in your home.

DETAILS OF THE DESIGN. Since the design is truly nautical, it only made sense to keep this project as consistent with a real boat as I could. And that meant making parts like a "stern thwart" and "gunwales" to stay on theme, as you can see in the drawing on the next page.

Of course, the real kicker is the curved sides that bend gently from the stem post at the top to the stern at the bottom. This added some challenges to this bookcase, but I think you'll find that it's well within the reach of any woodworker. All in all, it makes for an entertaining build if you're looking to think outside of the box with your next project.

Construction Overview / OVERALL DIMENSIONS: 30½"W x 69½"H x 13¾"D



A breasthook serves to reinforce the bow in traditional wood boat construction. This band-sawn breasthook is no different, but it also lends a decorative touch.

At the back of a boat, the stern thwart serves much the same purpose for reinforcing the stern, as well as capping the gunwales at the bottom.

Start with the **BACK & SHELVES**

Since this obviously isn't your ordinary bookcase, it's only natural that it doesn't go together in the ordinary way. Typically, you'd build a bookcase by starting with the case and then adding the shelves and back. But the curved sides on this bookcase make that approach difficult.

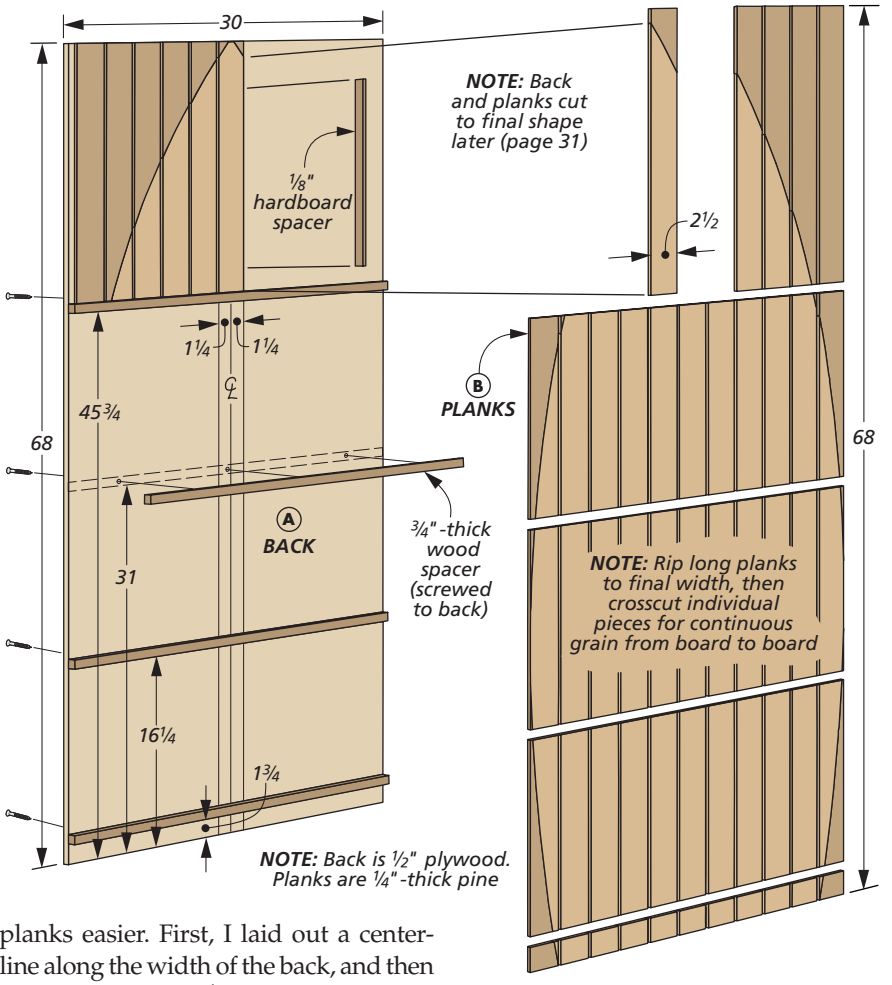
Instead, you'll actually create the back and shelves of this bookcase first. These parts will then serve as a form for bending the sides to create the curve.

BACK PANEL. The back of the bookcase is made from ½"-thick plywood. You'll want to start with a piece that's extra wide for now, but you can cut it to the final length shown in the drawing at right. You need the extra width for laying out and cutting the back to shape later on.

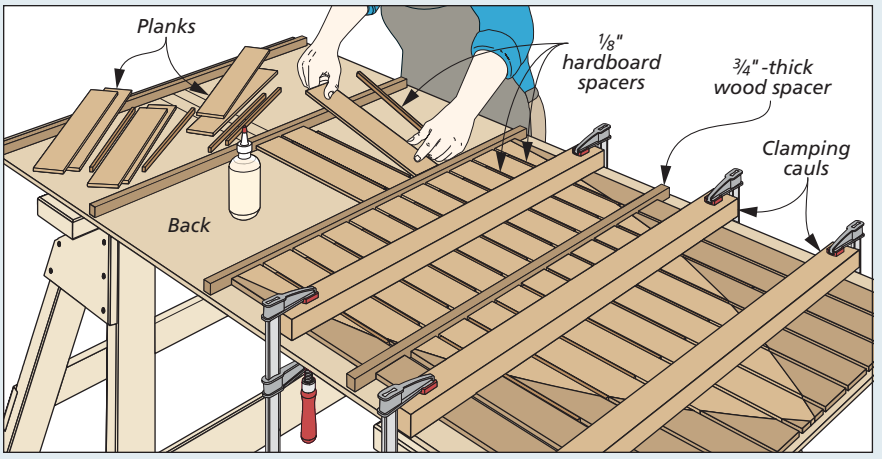
PLANKS. Thin pine planks are glued to the back to look like the bottom boards of a boat. They're ¼" thick, so I started by resawing stock from thicker boards to make the best use of my material.

As shown in the drawing at right, the planks are cut into shorter lengths to form "dadoes" for the shelves. But I wanted the grain to be consistent from one board to the next, so I started with longer planks that I ripped to final width. You'll make 11 of these in all.

LAYOUT. Next up was a little layout work on the back to make installing the planks easier. First, I laid out a centerline along the width of the back, and then marked two lines 1¼" out from that one to establish the location for mounting the center plank. In addition, I laid out the mounting positions of the shelves and stern. Finally, I screwed temporary ¾"-thick spacers in these positions to create the dadoes for the shelves and stern.



How-To: INSTALL THE PLANKS



Spacers, Clamps & Cauls. Spacers position the planks properly across the back panel, and clamps and cauls hold them in place while the glue dries.

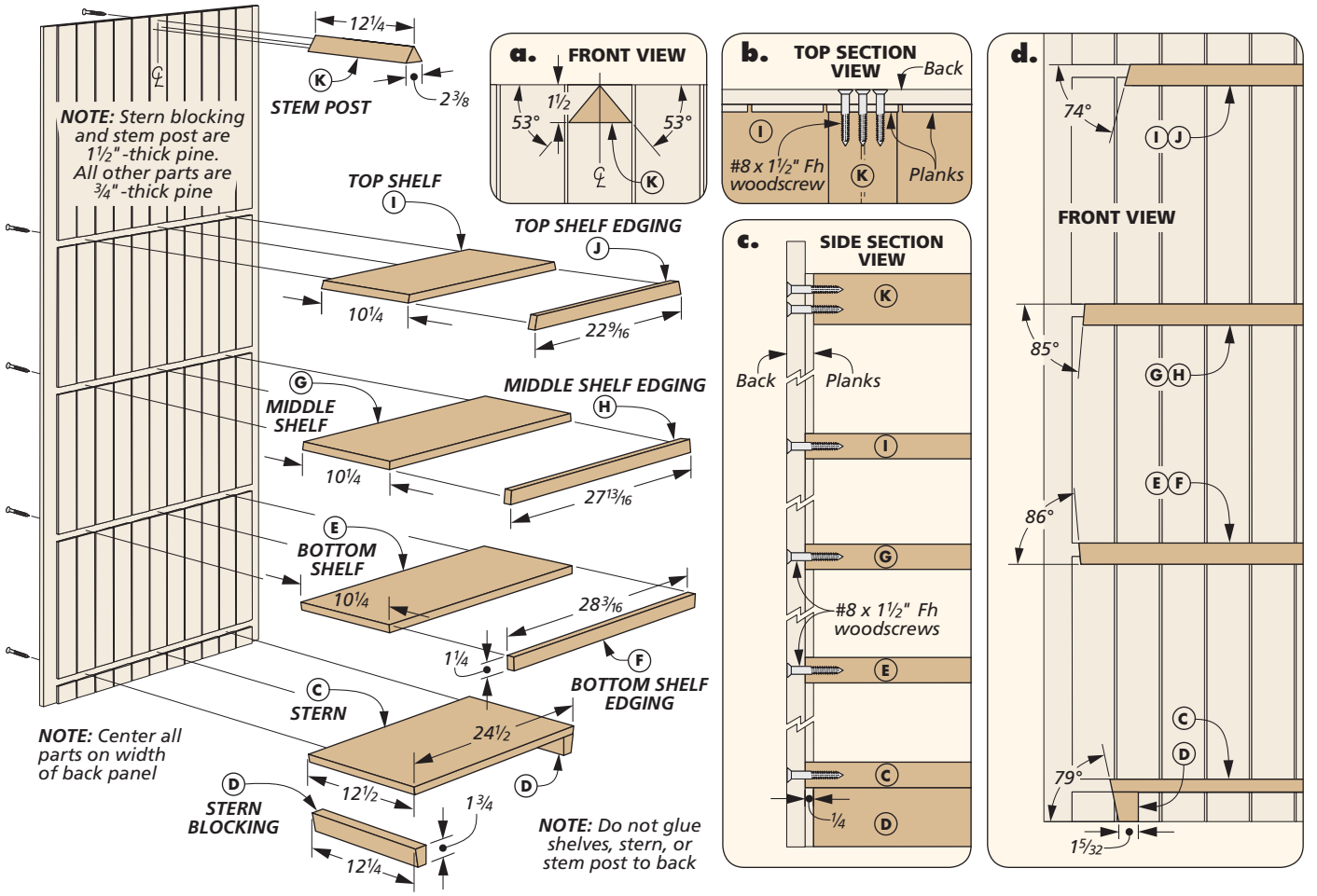
INSTALLING THE PLANKS. Now, you're finally ready to measure and crosscut the individual pieces from the planks to fit on the back, as shown above. You'll want to label these pieces so you'll know where to mount them on the back to ensure consistent grain from one piece to the next.

Once all the parts are prepped, it's easy to glue them to the back as shown in the drawing at left. I suggest running a thin bead of glue down the center of each plank, so that it doesn't squeeze out into the gap between the planks.

As you can see at left, I used pieces of hardboard to space the planks properly, and I added clamps and cauls to apply downward pressure onto the planks as the glue dried. You'll want to do one section at a time so the glueup doesn't get overwhelming. Once the planks in one section are glued in position, move on to the next section. The planks at the bottom can be held in place with spring clamps.

SHELVES, STERN & STEM POST

When the glue on the back dries, remove the shelf spacers and use the



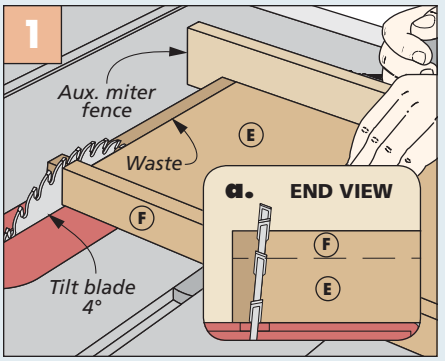
dadoes on the back as guides for planing stock for the stern and shelves. Each one is a panel that's made by gluing up narrower boards (refer to the drawings shown above for the widths).

Once you glue up the panels and cut the stern and shelves to final width and extra long, you'll want to add an edging strip to each of the shelves. Note that the edging is wider than the thickness of the shelves. After gluing the edging to the shelves, you'll bevel the ends to final length, as shown in Figure 1. The bevel angles on each shelf are different (refer to detail 'd' above).

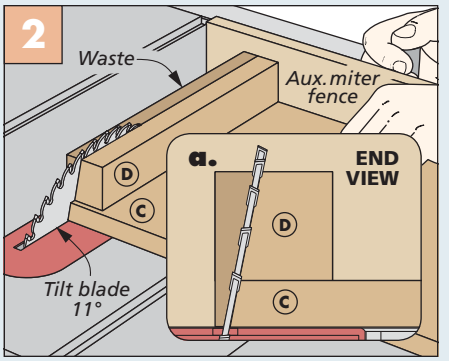
STERN. Instead of edging, the stern has blocks underneath that form the bottom of the bookcase. But here again, they can be glued to the stern before beveling the ends at the table saw (Figure 2). Note that the stern overhangs the blocks by ¼" at the back (detail 'c' above).

STEM POST. The triangle-shaped piece at the top of the back panel is the stem post. It serves as a mounting point for the curved sides. To cut it safely at the table saw, you'll start with a wide board and make two passes (Figure 3). Secure all these parts to the back with screws but without glue at this stage.

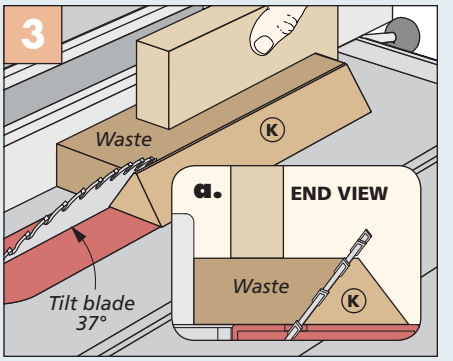
How-To: CUT BEVELS ON THE TABLE SAW



Shelves. Tilt the blade slightly, and trim the ends of the shelves using a miter gauge with an auxiliary fence.



Stern. Bevel the ends of the stern in a similar fashion. You'll need to raise the blade to cut through the stern blocking.



Stem Post. Start with a wider blank and bevel one edge. Flip the blank and reset the fence to complete the stem post.

The boat begins TO TAKE SHAPE

The next parts to go on are what make this bookcase truly unique: The curved skins that form the sides of the case. It's really not a difficult process, but it takes a specific sequence to get it just right.

Two skins form each side of the boat: An inner and outer skin. Each one is made from ¼" pine that's glued up into a wider panel. As you can see in the drawings at right, the inner skin gets screwed in place, while the outer skin is glued to the inner skin to hide all the fasteners.

The bending process helps you accomplish a few goals. First, bending the inner skins around the shelves allows you to lay out the shape of the back panel. After you cut the back to final size, you'll reattach the inner skins so that they rest against the face of the back panel. Finally, you'll add the wider outer skins to conceal the screw heads and edges of the back panel.

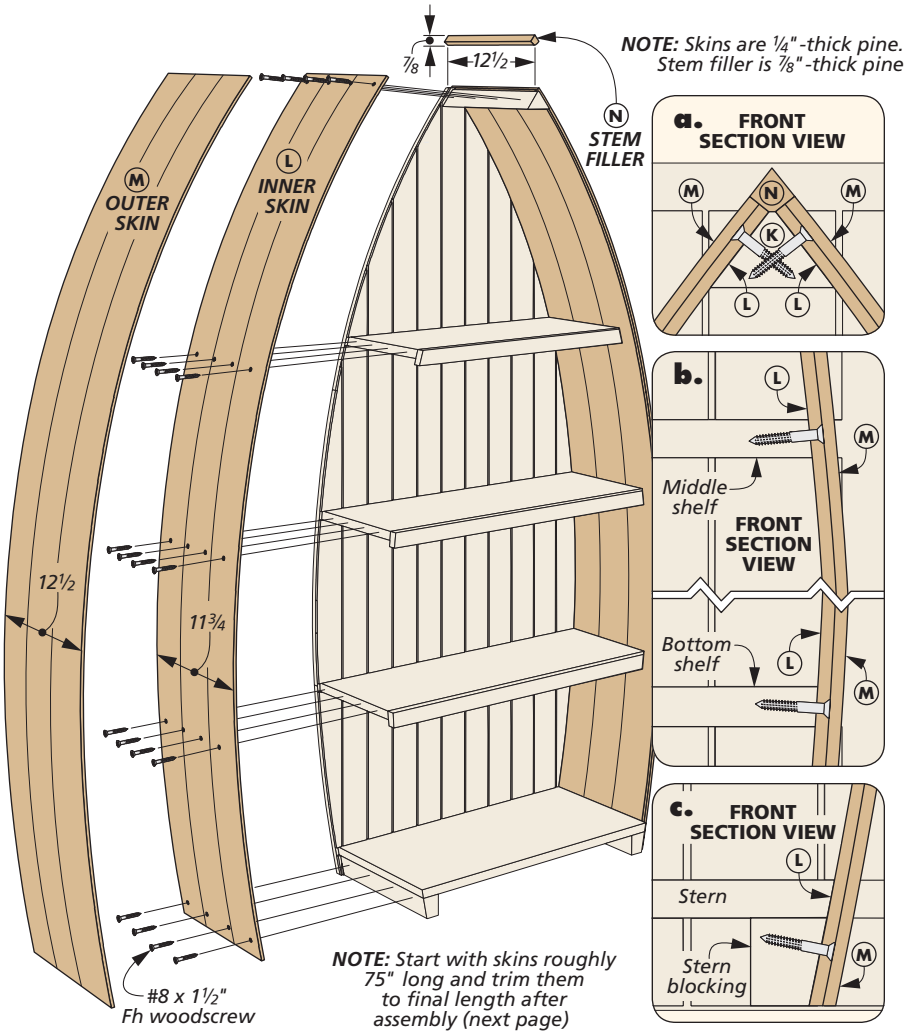
MAKE THE SKINS. As with the planks you made previously, you resaw stock for the skins from thicker boards. Then glue up panels to form the skins. When the glue dries, plane them smooth. Cut them to final width but leave them extra long for now. Note that the outer skin is ¾" wider than the inner skin, as mentioned earlier.

PREP FOR BENDING. You're just about ready to begin the process of curving and installing the inner skin. But you need to do a little prep work first. The bending process puts a lot of strain on the components of the bookcase, particularly the stem post, shelves, and stern. So you'll want to reinforce all these parts before you start bending. Specifically, this involves cutting and installing spacers in the openings between the shelves, as well as between the bottom shelf and stern and top shelf and stem post (Figure 1). Also, secure the back panel firmly to your workbench, so it won't shift around during the bending process.

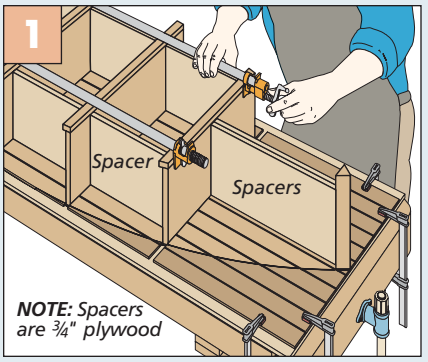
In addition, I also made a large block with a wide V-notch cut in it, as shown in Figure 1 on the following page. As you begin the bending process, this block helps "lock" the skins to the stem post.

ADD THE INNER SKINS. With all the spacers in place and the V-block ready to go, you can align the top ends of the inner skins with the stem post, drill pilot holes, and screw them in place. The long skins will be jutting out like wings at this point, as shown in Figure 2 at left. Now clamp the V-block in place above the stem post and inner skins (refer to Figure 1 on the following page).

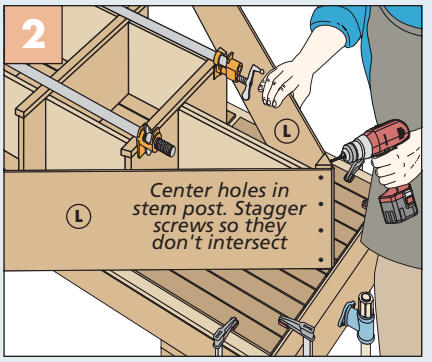
The best way to install the inner skins is to bend both of them at the same time. So it's a good idea to recruit a helper to bend one skin as you work on the other one. Bend and hold the skins tightly against the upper shelf, and slip on a clamp to



How-To: GET READY TO BEND



Reinforcement. Plywood spacers cut to fit the case openings support the parts while bending the skins.



Attach Inner Skins. Align the inner skins at the top of the stem post, drill pilot holes, and drive in screws.

hold them in place. Then transfer layout lines from the shelves around to the outside face of the inner skins. Now drill pilot holes, and drive in screws to secure the inner skins to the ends of the shelves (refer to Figure 1). Repeat the process, bending the skins, clamping, and driving in screws in each shelf end, as well as the stern blocking at the bottom.

LAYOUT & CUT. As mentioned earlier, you're only temporarily attaching the inner skins at this point. Next, you'll need to lay out and cut the back to final shape before reattaching the skins for the final time. To do this, take a pencil and trace the shape of the skins onto the back panel (Figure 2). Then back out the screws in the inner skins, the shelves, the stern, and the stem post, and remove those parts from the back. Place the back on a pair of sawhorses and cut around the tracing with a jig saw, staying just outside the layout lines, as shown in Figure 3.

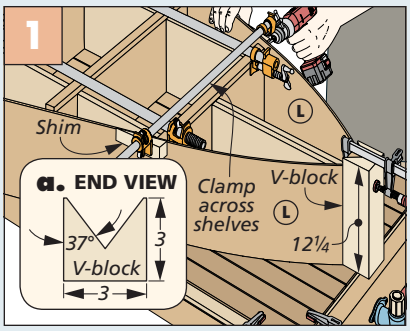
Now reinstall all the parts, this time using glue and screws for a more secure, permanent hold. Once the inner skins are back in place, flip the bookcase over on a workbench and use a router with a flush-trim bit to cut the back panel perfectly flush with the inner skins. Figure 4 shows you the process.

OUTER SKINS. After installing the inner skins, the outer skins should be fairly straightforward. Put back all the spacers you used previously for reinforcement. Then spread glue evenly on the inner faces of the skins, clamp them to the top of the bookcase, and clamp the V-block in place to capture them.

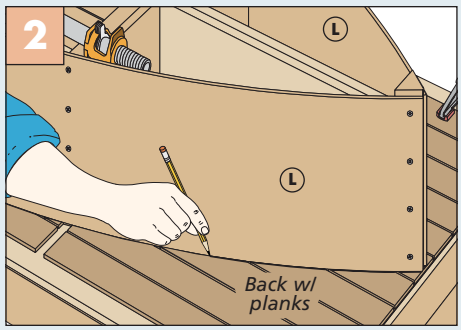
Now work your way around the case, bending the skins in place and applying clamps around the perimeter. At the front of the case, you can use small bar clamps or C-clamps. At the back, clamp across both skins with longer bar or pipe clamps. You may need to use shims to keep the clamps from slipping, as shown in Figure 5. Finally, trim the skins flush at the bottom of the bookcase with a hand saw, as illustrated in Figure 6, and sand them flush.

STEM FILLER. The point at the top of the bookcase is filled in with a stem filler. After cutting the piece to final size, bevel the bottom edge at the table saw (Figure 7). Then glue and clamp it in place, and do the final shaping with a block plane and sandpaper (refer to Figure 8).

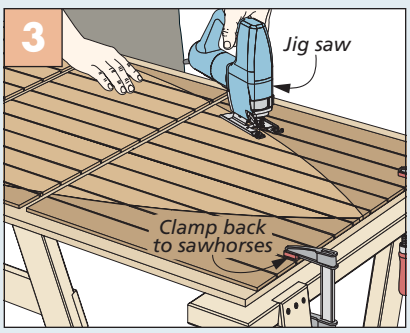
How-To: INSTALL SKINS & STEM FILLER



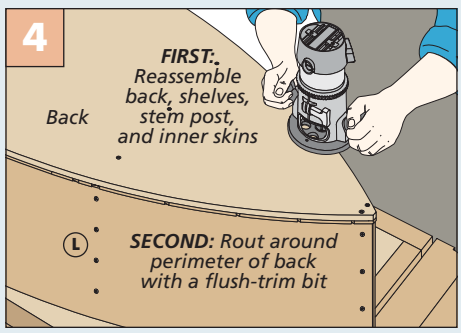
Bend It. Work your way around the case, bending the skins tight and clamping them before adding screws.



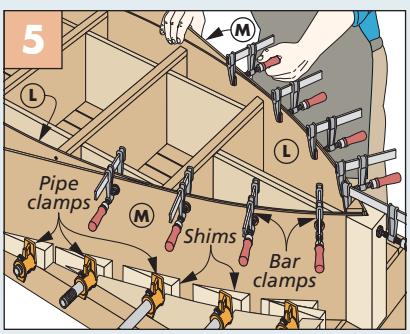
Trace Curve. Use a pencil to trace the shape of the inner skins onto the back panel of the bookcase.



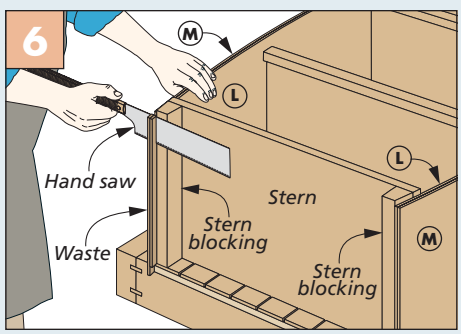
Cut Back. After removing the parts from the back, cut it to shape with a jig saw, staying slightly outside the lines.



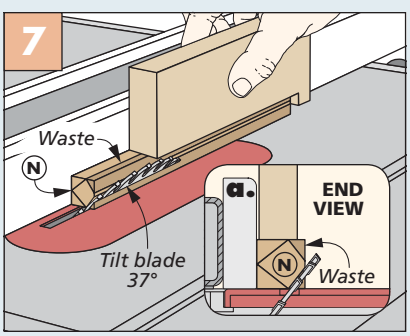
Trim Flush. Reassemble the bookcase, flip it over, and trim the back panel flush with the inner skins with a router.



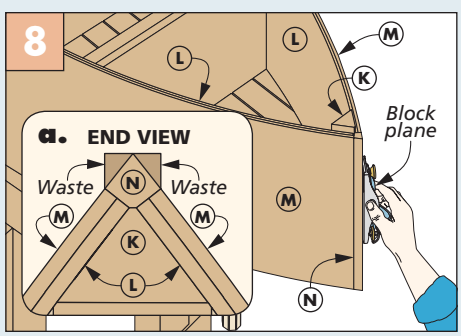
Outer Skins. Short clamps above and long clamps below help you glue and bend the outer skins.



Trim Bottom. Once the glue dries, use a hand saw to trim the skins flush with the stern blocking at the bottom of the case.



Stem Filler. Bevel the bottom of the stem filler with two quick passes over the table saw blade.



Shape It in Place. After installing the stem filler, a block plane and sandpaper handle the final shaping of the piece.

Finish up the **BOOKCASE**

Just a few parts remain for completing the bookcase. A pair of gunwales cap each side and finish the boat in the traditional way. Then, a breasthook and stern thwart are screwed to the top and bottom, respectively, to provide reinforcement to the gunwales and a decorative touch to the bookcase.

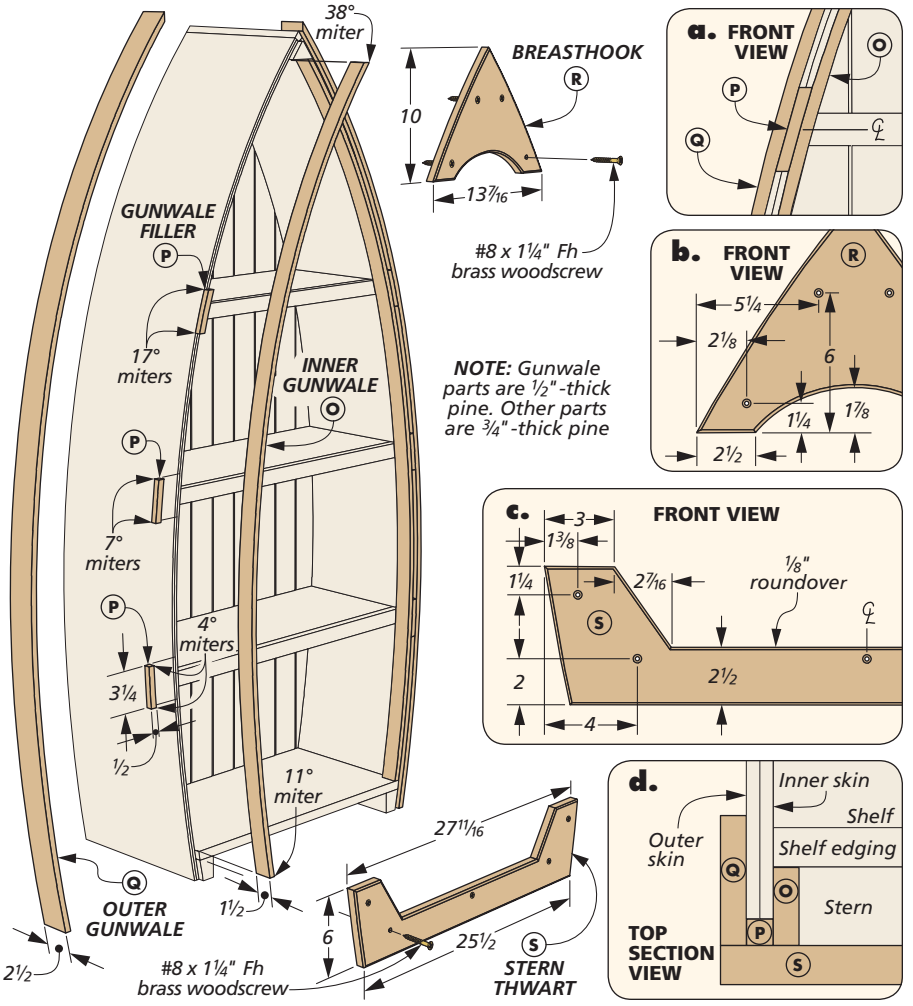
GUNWALES. By now, you should be an expert at bending parts, so adding the gunwales to the boat shouldn't pose any unique challenges. The gunwales are thicker than the skins, so they require a little more muscle to bend. But they're also narrower, which makes them a lot easier to glue and clamp in place.

I started with the inner gunwales. After ripping these pieces to width, you can flex a tape measure around the inside perimeter of the inner skin to get a measurement for the gunwale length. Once you cut them to final length, miter the ends to match the contour of the inside of the bookcase. The drawing at right has the approximate miter angles.

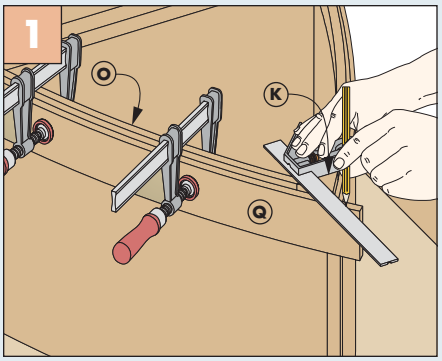
After checking the fit, adding the inner gunwale is a matter of applying glue to the inside face, flexing it to fit, and gluing and clamping it in place in several places. The inside edges of the gunwales butt against the shelf edging.

GUNWALE FILLERS. The space between the two gunwales is occupied by gunwale fillers, and those go on next. After you cut them to size, miter the ends. The rough miter angles are shown above, but the goal is for the ends to be parallel with the shelf faces. Then butt them against the skins, centered on the thickness of the shelf edging strips (detail 'a'), and glue and clamp them in place.

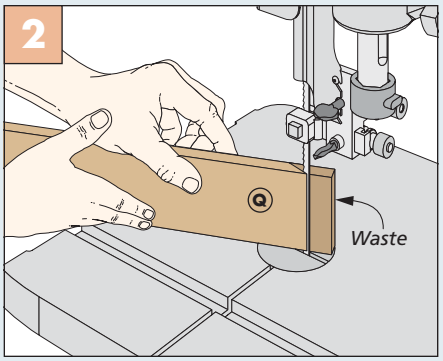
OUTER GUNWALES. The outer gunwales are a little more challenging. And that's mainly because you need a tight-fitting miter at the top end. After cutting the parts to width and extra long, I clamped them near the top of the case and used a combination square to mark the angle,



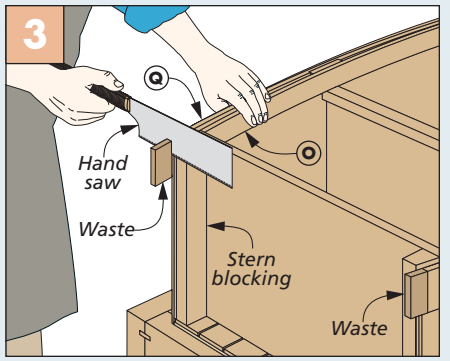
How-To: ADD THE OUTER GUNWALES



Layout. Clamp the outer gunwale to the top of the case, and mark the angle using a square and a pencil.



Band Saw. Cut the top end of each outer gunwale by making a quick angled cut using the band saw.



Trim Bottom. Once you have the outer gunwale attached, trim the bottom to final length with a hand saw.

as in Figure 1 on the previous page. Then I used a band saw to trim the top ends of the pieces (Figure 2). You may want to check and fine-tune the fit with a block plane and sandpaper before you glue them on.

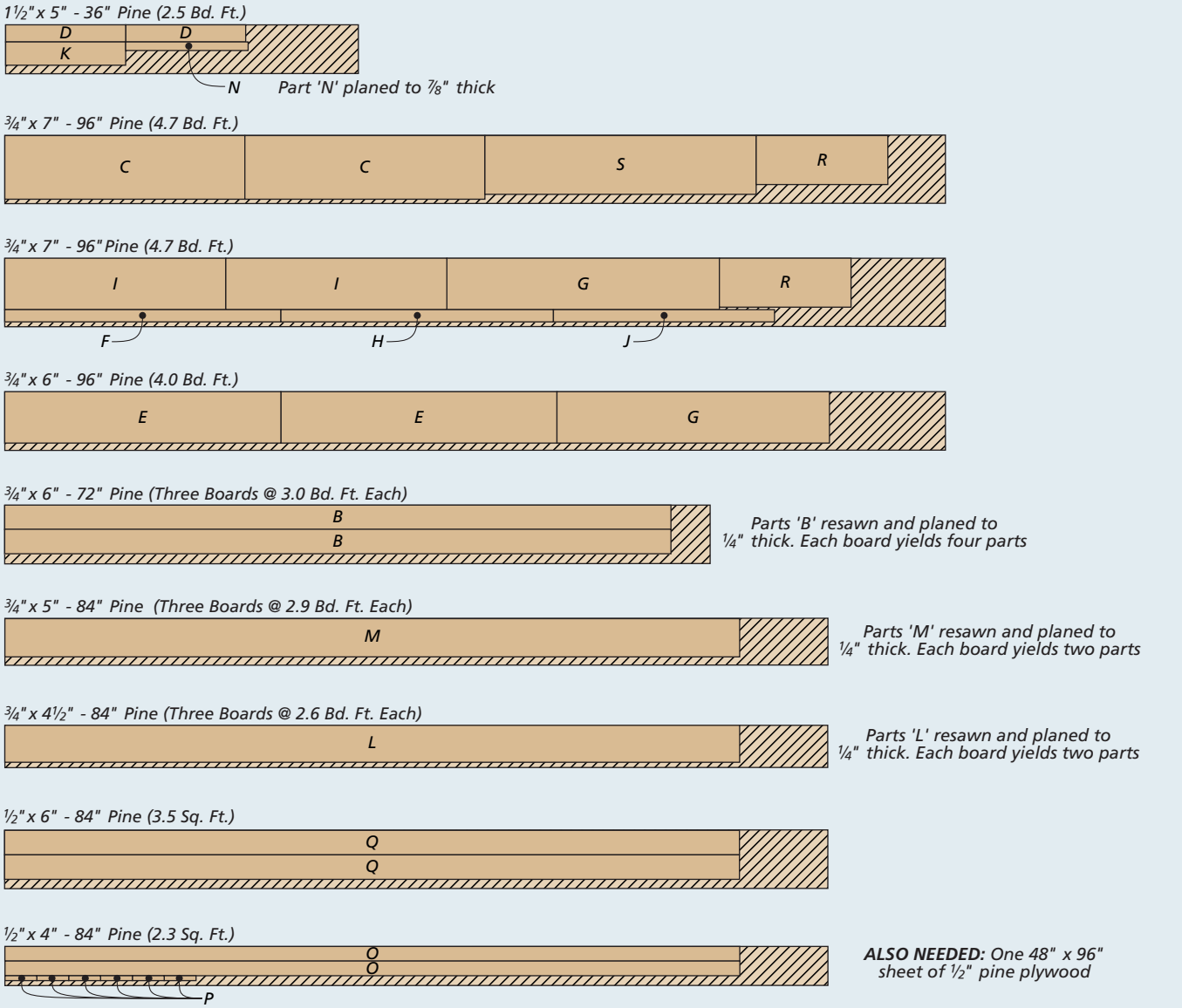
After that, though, adding the outer gunwales is similar to the outer skins. Apply glue, clamp them to the top of the case, and clamp on the V-block for additional support. Then work your way down, gluing and clamping the gunwales around the perimeter. Finish up by trimming the outer gunwales to final length at the bottom (Figure 3).

BREASTHOOK & STERN THWART. The breasthook and stern thwart are the finishing touches to the boat bookcase. You can see the shapes and screw hole locations in details 'b' and 'c,' previous page. Cut the parts at the band saw, and round over the edges at the router table. Then drill countersunk pilot holes, and attach them with brass screws.

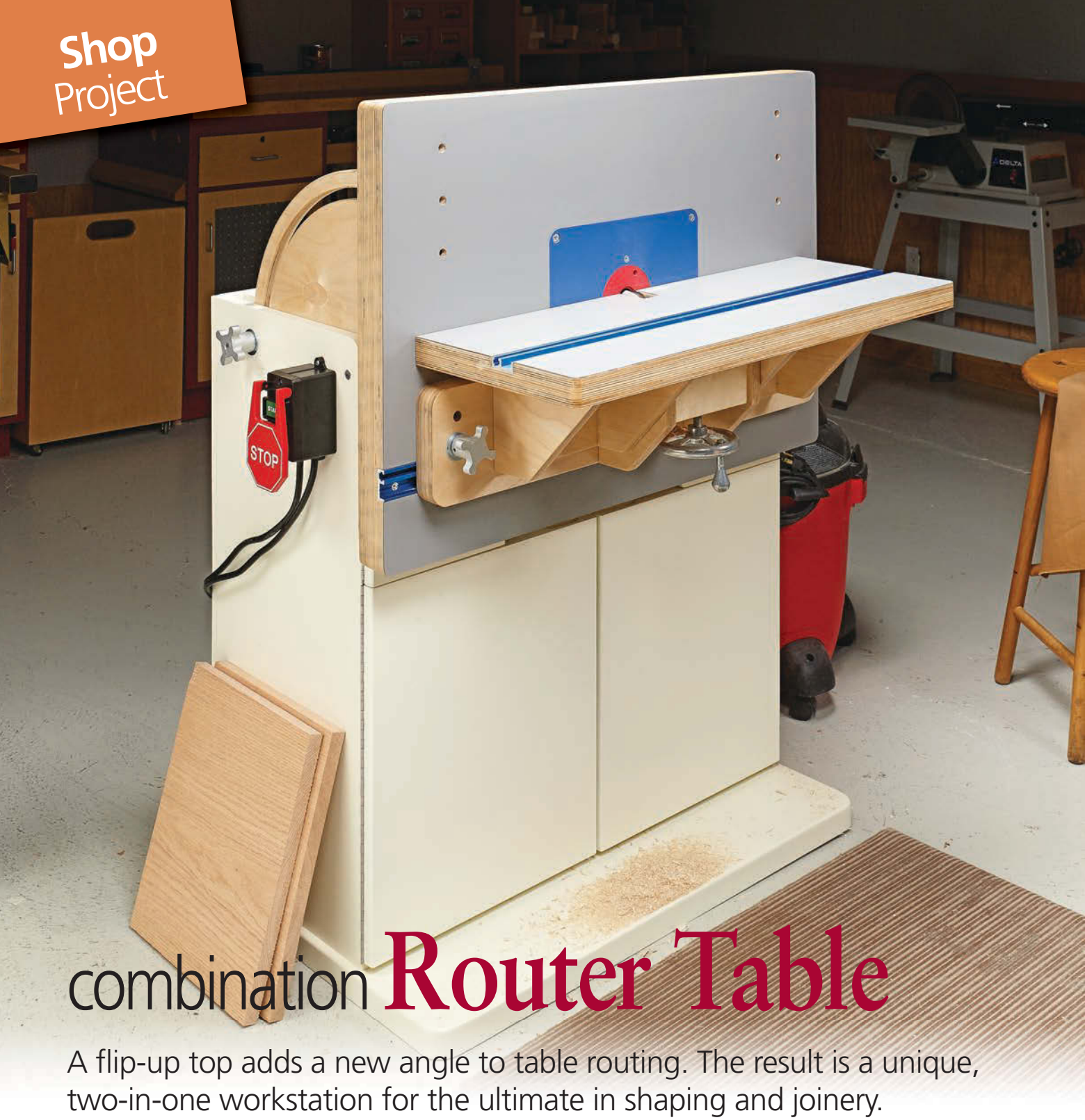
SAIL AWAY. You might now be tempted to test the seaworthiness of your new vessel. Instead, I'd recommend applying paint and finish (refer to page 67) and then filling the bookcase with your favorite nautical-themed books.

Materials, Supplies & Cutting Diagram

A Back (1)	1/2 ply. - 30 rgh. x 68	**H** Middle Shelf Edging (1)	3/4 x 1 1/4 - 27 13/16	**O** Inner Gunwales (2)	1/2 x 1 1/2 - 75 rgh.
B Planks (11)	1/4 x 2 1/2 - 68 rgh.	**I** Top Shelf (1)	3/4 x 10 1/4 - 22 9/16	**P** Gunwale Fillers (6)	1/2 x 1/2 - 3 1/4
C Stern (1)	3/4 x 12 1/2 - 24 1/2	**J** Top Shelf Edging (1)	3/4 x 1 1/4 - 22 9/16	**Q** Outer Gunwales (2)	1/2 x 2 1/2 - 75 rgh.
D Stern Blocking (2)	1 1/2 x 1 3/4 - 12 1/4	**K** Stem Post (1)	1 1/2 x 2 3/8 - 12 1/4	**R** Breasthook (1)	3/4 x 10 - 13 7/16
E Bottom Shelf (1)	3/4 x 10 1/4 - 28 3/16	**L** Inner Skins (2)	1/4 x 11 3/4 - 75 rgh.	**S** Stern Thwart (1)	3/4 x 6 - 27 11/16
F Bottom Shelf Edging (1)	3/4 x 1 1/4 - 28 3/16	**M** Outer Skins (2)	1/4 x 12 1/2 - 75 rgh.	• (55) #8 x 1 1/2" Fh Woodscrews	
G Middle Shelf (1)	3/4 x 10 1/4 - 27 13/16	**N** Stem Filler (1)	7/8 x 7/8 - 12 1/2	• (9) #8 x 1 1/4" Brass Fh Woodscrews	



Shop Project



combination Router Table

A flip-up top adds a new angle to table routing. The result is a unique, two-in-one workstation for the ultimate in shaping and joinery.

Installing a router upside down in a router table is a surefire way to upgrade any workshop. The versatility of a router table opens up new options for improving the fit and finish of your projects.

However that isn't the only way to get more from a router. A router mounted horizontally offers some big benefits for certain tasks, like creating raised panels and cutting mortises and tenons.

Taking advantage of each configuration doesn't mean you need two separate tools. The top of this router table flips up to convert from a standard router table to a horizontal table in just a few seconds.

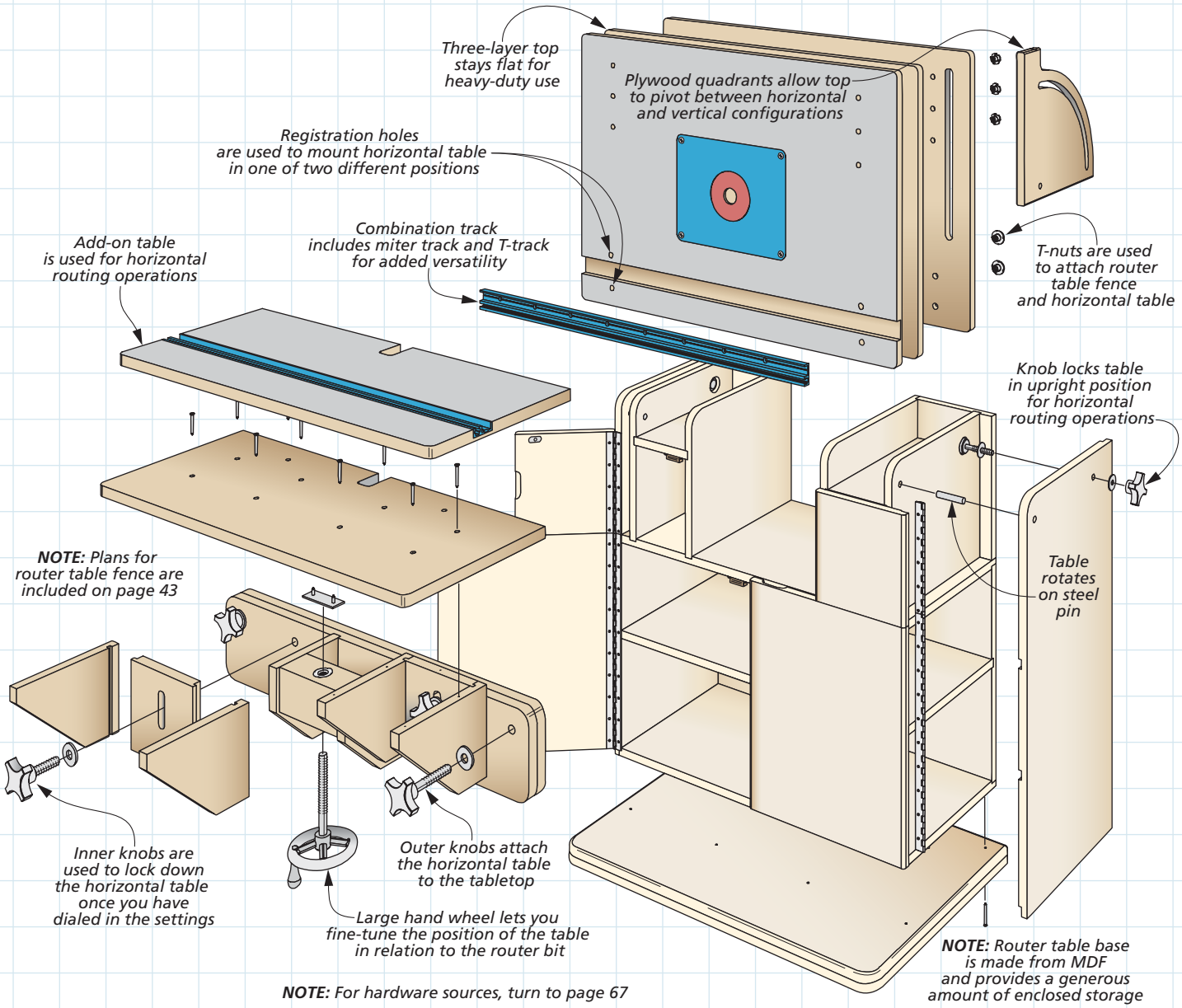
VERSATILE ACCESSORIES. To support the workpiece in the horizontal mode, you replace the fence with the adjustable table shown in the photo above. That's all you need for most shaping tasks.

An add-on mortising jig makes setting up and cutting mortises a breeze, as shown in the middle photo on the next page. Both of these accessories stow away neatly in the storage space below the top.

Despite its size, building this router table is straightforward and breaks down into easy-to-manage components. You'll end up with a combination machine that expands the capabilities of your router.

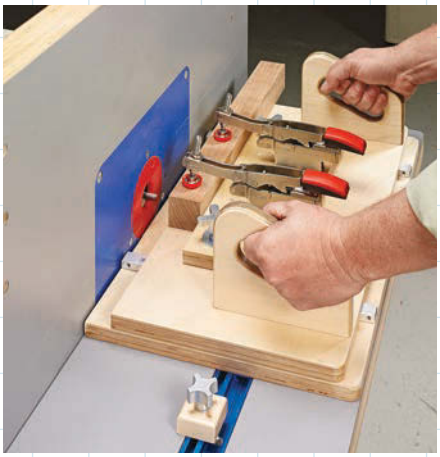
Construction Overview /

OVERALL DIMENSIONS: 34"W x 47¼"H x 30¼"D (Horizontal setup)
34"W x 40½"H x 24"D (Standard setup)



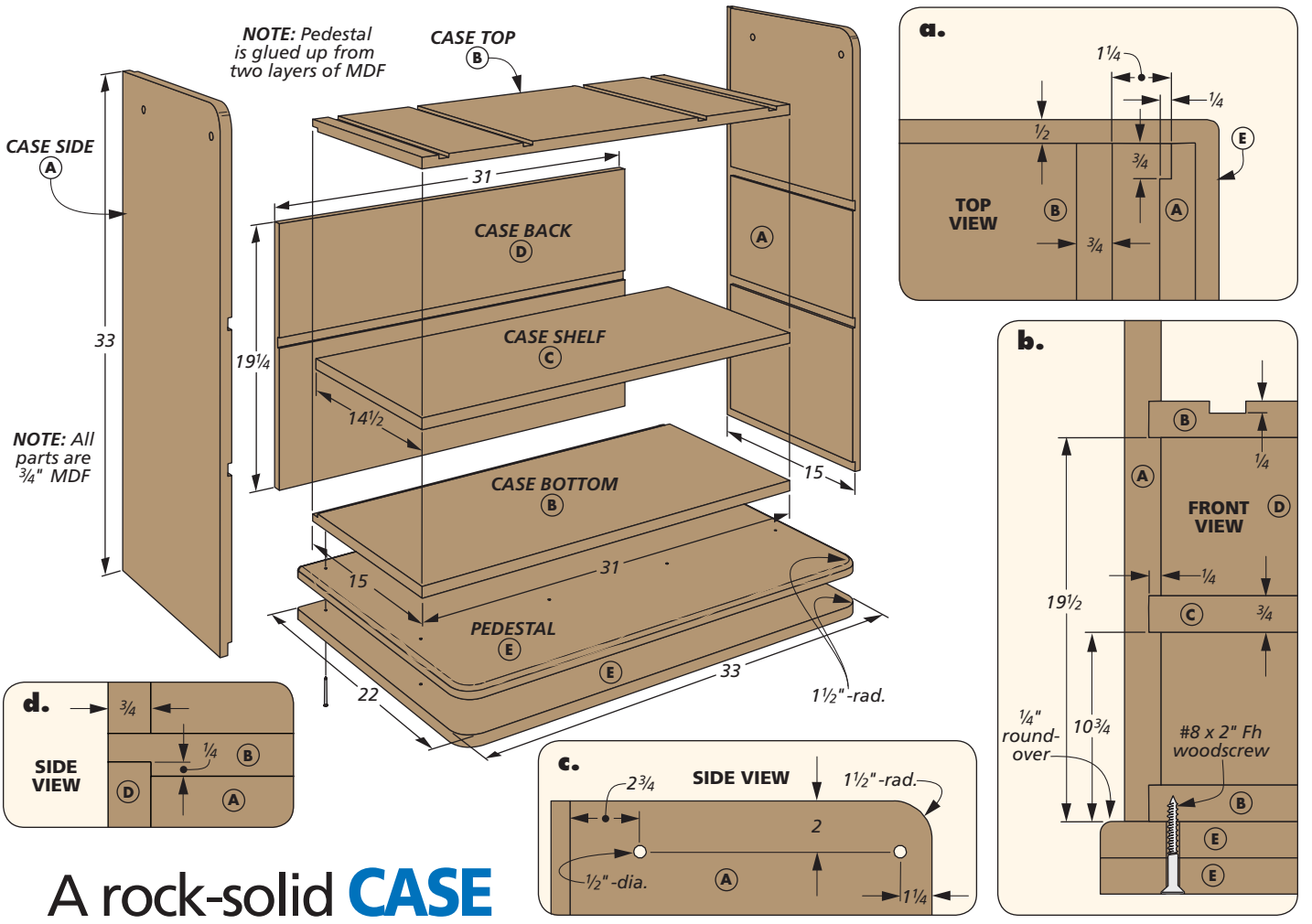
NOTE: For hardware sources, turn to page 67

A large, thick table and a simple, adjustable fence tackle most router table tasks with ease.



The add-on mortising jig and stops make cutting smooth, accurate mortises a walk in the park.

The storage area below holds the router table accessories or other gear you need to organize.



A rock-solid CASE

A router table that can be configured for horizontal or vertical use requires a sure-footed stance both when routing and while making the transition from one mode to the other. That job falls mainly to the case and pedestal of the router table.

The case uses two approaches for creating stability. First, the overall structure of the case creates a wide footprint that provides a good balance no matter how the router table is set up. This large case also lets you sneak in some storage space for the accessories that are added later.

The choice of materials also plays a role in how well the case works. I used MDF here. And if you've ever lifted a sheet of MDF, you know why it can make a case feel more solid. The mass of MDF offers a nice side benefit, as well. It helps dampen vibration from the router.

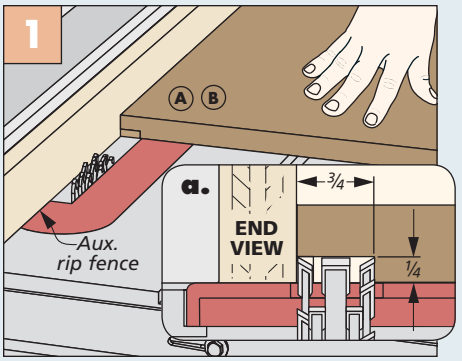
SIMPLE CONSTRUCTION. The drawing above shows how the case is assembled. Rabbets and dadoes join the parts together. But this isn't your typical square box case. The sides extend well above the top. This open space is used primarily for housing the parts that allow the tabletop to change positions.

Figures 1 and 2 highlight the methods for cutting rabbets and dadoes at the table saw. These details help anchor parts together and increase the glue surface for each joint. You put this setup to use in cutting the joints in the sides to accept the top, bottom, shelf, and back.

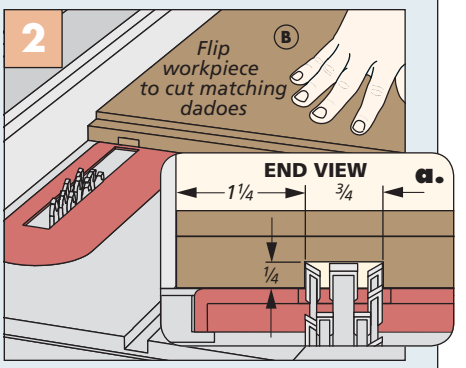
In addition, the top and bottom have a rabbet along the back to capture the case back. A set of dadoes in the top anchor two smaller assemblies shown on the next page. A groove in the back panel allows it to interlock with the shelf.

A FEW DETAILS. Before getting out the glue bottle and clamps, I drilled a couple of

How-To: CUT RABBETS & DADOES



Rabbets. An auxiliary fence allows you to position the fence alongside the dado blade without damaging the rip fence.



Dadoes. Take your time to size the dado blade to match the thickness of the MDF for snug-fitting joints.

holes in the sides that serve as the hinge and locking points for the tabletop. I also relieved the upper corner of the sides with a radius, as shown in detail 'c' on the previous page. This allows the top to pivot freely.

ADD A PEDESTAL. After assembling the case, you can move on to making the pedestal. It's made up of two layers of MDF and extends out in front of the case to improve balance, primarily when the table is set up for horizontal operations.

CASE WRAP UP

The open, upper portion of the case is where you'll turn your attention to next. Here, you need to add two small assemblies next to the case sides, as shown in the drawing at right. These offer additional storage. The space between them will house the router.

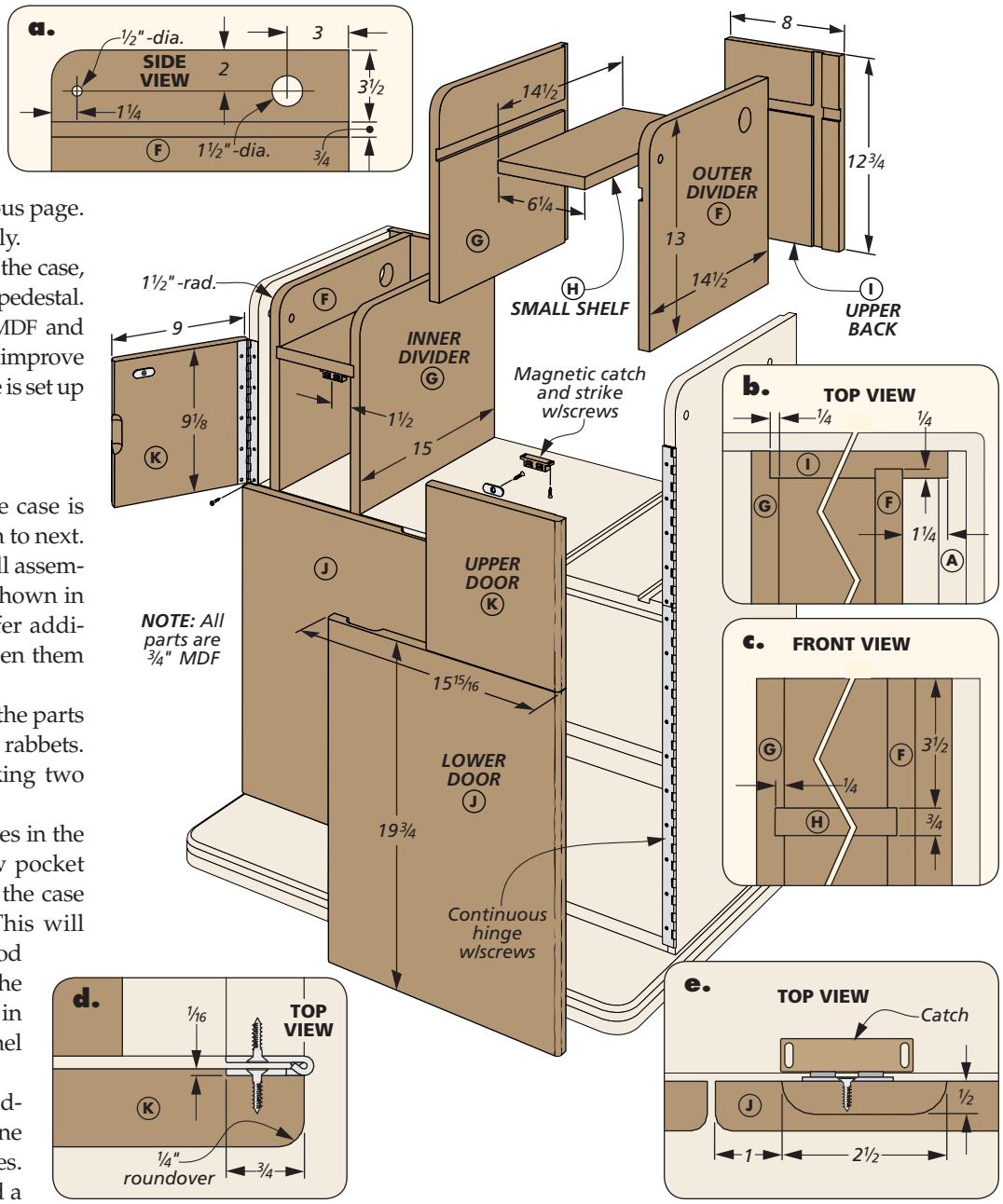
FAMILIAR JOINERY. Here again, all the parts are joined with dadoes and rabbets. Keep in mind that you're making two mirror-image assemblies.

The dividers fit into the dadoes in the case top. This creates a narrow pocket between the outer divider and the case side, as shown in detail 'b.' This will house a large, arc-shaped plywood panel added later that allows the tabletop to pivot and be locked in place. An overlapping back panel encloses the space.

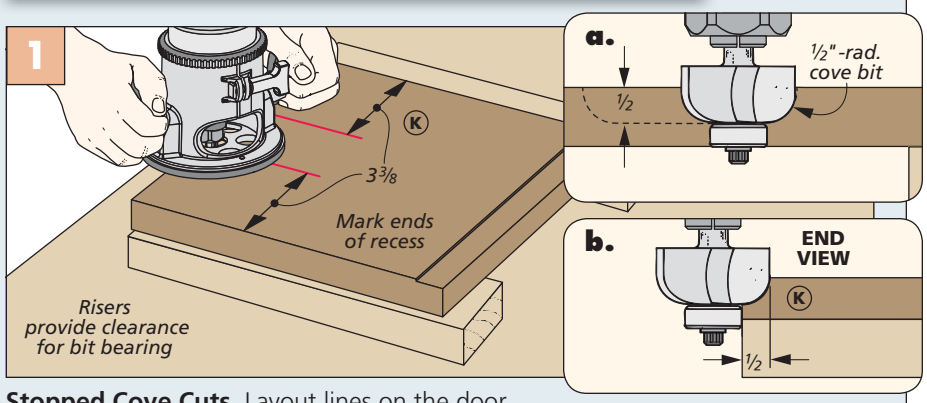
DRILL SOME HOLES. The outer dividers have a pair of holes that line up with the holes in the case sides. I used the holes in the sides and a drill bit as guides for marking the locations in the dividers. Then I drilled the holes at the drill press. Take note in detail 'a' that the rear hole is larger to allow for better access to install the table locking hardware later on.

ADD DOORS. The storage areas are enclosed with simple slab doors. The hinge side of each door has a shallow rabbet to hold a continuous hinge. The box at right shows how to create low-profile pulls. Soften the outer edges using a roundover (details 'd' and 'e'). The doors are held closed with magnetic catches.

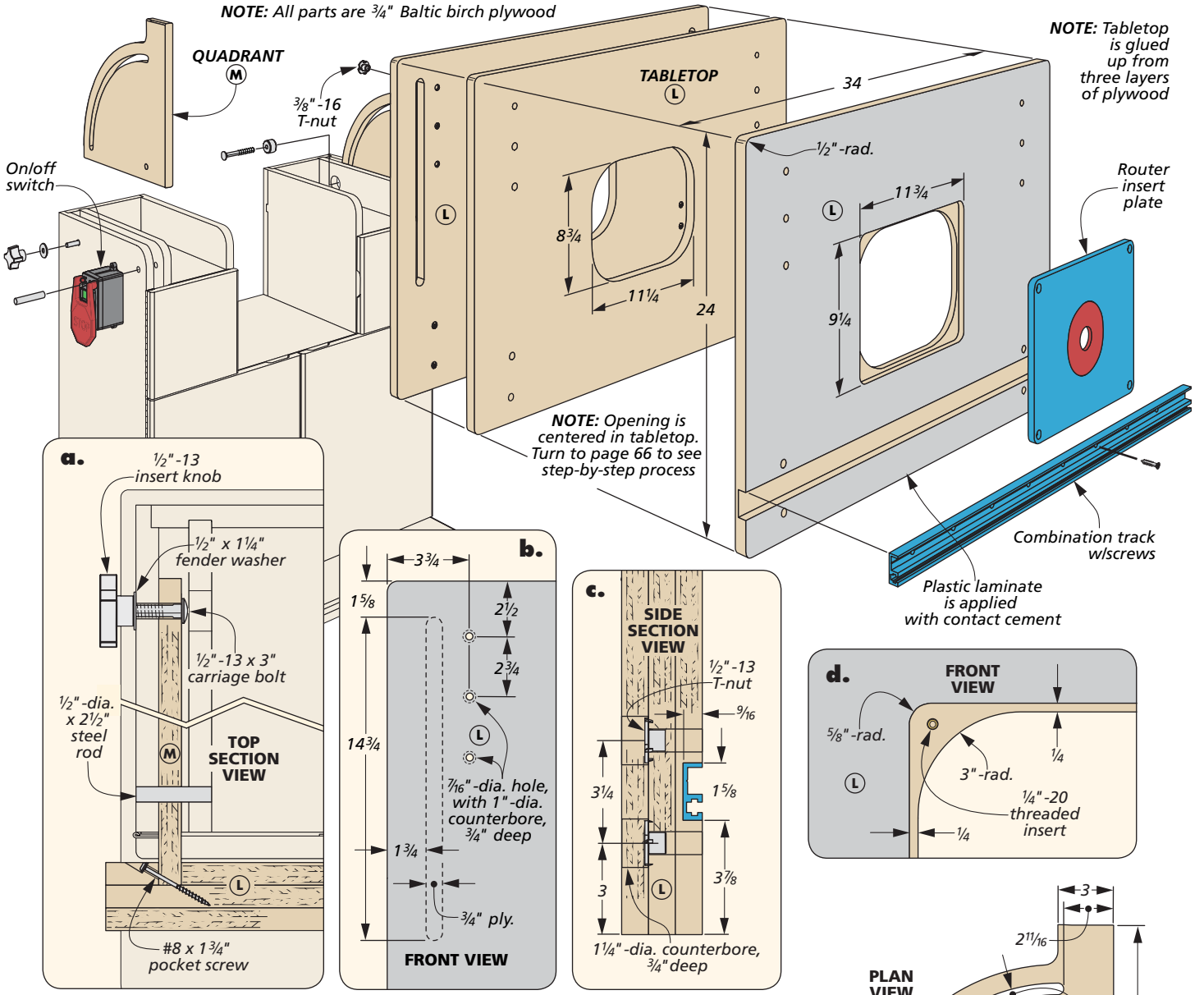
That wraps up the work on the case. Before moving on to the top, I painted the case after sealing the edges of the MDF and applying a coat of primer. You can find the color I used on page 67.



How-To: CUT RECESSED DOOR PULLS



Stopped Cove Cuts. Layout lines on the door define the size of the pull recess. While it may be tempting to rout the profile in a single pass, it's best to work down to final depth in two passes.



The flip-up TOP

A high-quality router table top should have a smooth, hard-wearing surface that's large and flat. And it never hurts to include a miter track. The top shown in the drawing above has all those features checked off the list.

However, the dual-purpose nature of this table requires a few other items. In the horizontal routing setup, the top becomes a vertical mounting surface for the router and an auxiliary table. So it needs to stand up to the changing loads. This top also needs a secure connection to the tilting mechanism for long-term reliability.

HEAVY-DUTY CONSTRUCTION. The starting point for meeting all those requirements is laminating the top from three layers of Baltic birch plywood. To make the top, I cut one piece of plywood to final size and shape. Then, one at a time, I glued on two slightly oversize pieces of plywood and trimmed them with a hand-held router and a flush-trim bit.

All it takes to make the top smooth and durable is to add a piece of plastic laminate. It's applied with contact cement and trimmed like the plywood, as shown in Figure 1 on the next page.

ALL IN THE DETAILS. With the top in hand, it's time to start adding details. The first is drilling several sets of counterbored holes from the bottom (back) face, as shown in details 'b' and 'c.' The holes hold T-nuts that are used to attach the router table fence and the horizontal table.

I want to point out that there are two different sizes of T-nuts used. So the holes and counterbores are different, as well. Drill the counterbore for the T-nut first using a Forstner bit. Then use the center point to drill the through hole. It's a good idea to have solid backing below the table to prevent chipping the plastic laminate as the drill bit exits the hole.

VERSATILE MITER TRACK. Next up on the list of details is cutting a groove to hold a commercial miter track. The one I selected is a combination track that includes a miter

track and a T-track. The thing to keep in mind is that the track is wider than a dado blade. So you need to make the cut in multiple passes, as in Figure 2.

A LONG MORTISE. The top is connected to the table with a pair of curved plywood quadrants. For a solid connection, the quadrants fit into long mortises cut in the underside of the top. To determine the location of the mortises, center the top on the case and mark the top where it lines up with the pockets in the case.

Figure 3 shows a good method for making the mortises. A straightedge guides a hand-held plunge router. I used a plywood bit to ensure a good fit between the plywood and the mortise. The mortise is ¾" deep, so you need to rout it in several shallow passes.

A ROUTER INSERT PLATE. Back on the top face of the router table, you need to create an opening for the router insert plate. This is a little different than a typical opening. Since the table is designed to tilt upright, the insert needs to be anchored to the top so it doesn't fall out.

The insert plate I used has countersunk holes in the corners. Machine screws and threaded inserts lock the insert plate in place, as shown in detail 'd' on the previous page. To create the opening, I used a pair of templates (Figure 4). The full process is detailed in Shop Notes on page 66.

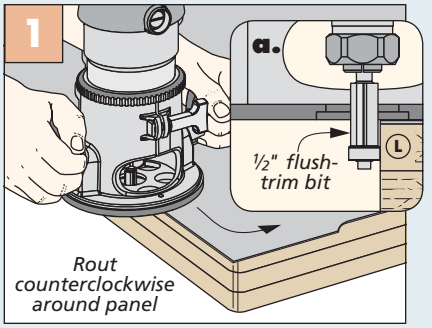
MAKING QUADRANTS. The work on the tabletop is complete at this point. So you can turn your attention to making the quadrants. These have a curved edge and a slot that's used to lock the tabletop in either working position. One edge of the quadrant is glued into the mortise in the underside of the tabletop.

Lay out the overall shape of the quadrant on a square plywood blank. Be sure to include the pivot hole, the curved slot, and the "ear" along one edge, as in the plan view on the previous page.

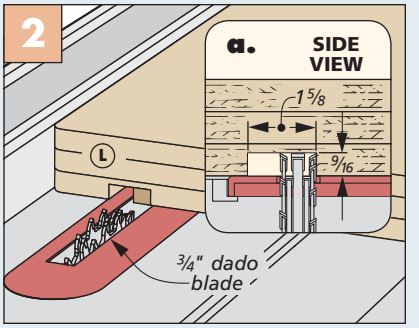
A jig saw makes quick work of cutting the quadrant to rough shape. Then I used a router with a simple hardboard trammel to clean up the edge, as shown in Figure 5. The trammel has a second pivot hole that's used to rout the slot.

After rounding over the outside edges (Figure 6), you can glue the quadrant in place. I used pocket screws to reinforce the joint, as in Figure 7. The tabletop is ready to be installed on the case using the hardware shown in detail 'a' on the previous page.

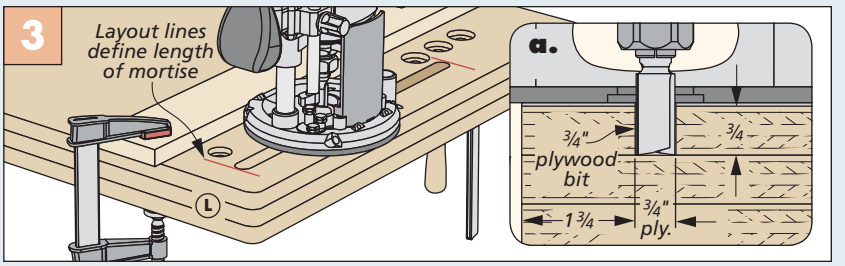
How-To: TABLETOP DETAILS



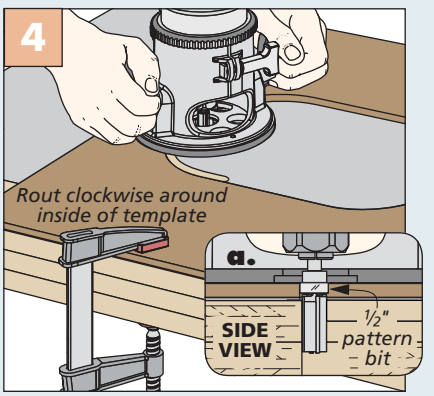
Trim It Flush. Applying an oversize piece of laminate is easier to line up. Trim it flush with a router.



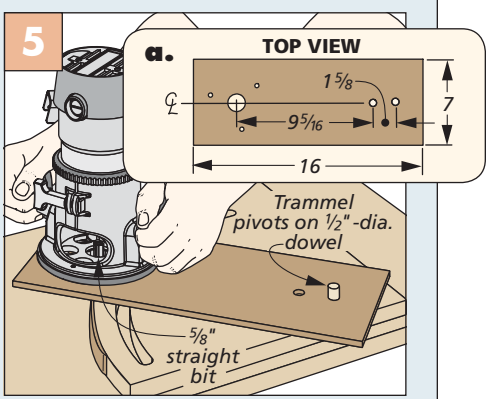
Cut a Track Groove. Fine-tune the rip fence to cut a groove that forms a snug fit with the miter track.



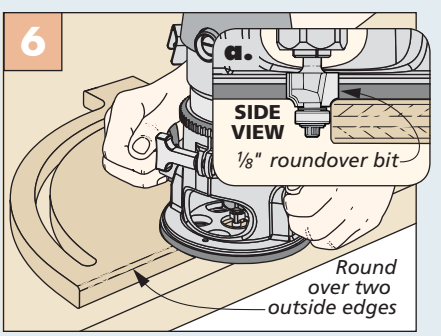
Rout a Long Mortise. Clamp a long straightedge to the table so the router bit aligns with the layout marks. To prevent overtaxing the router and bit, rout the mortise in several passes, moving from left to right along the guide.



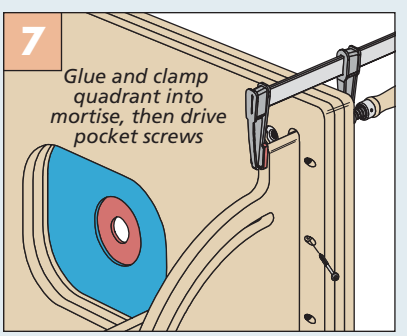
Two Templates. Turn to page 66 to see how templates guide a router to create a smooth, stepped opening.



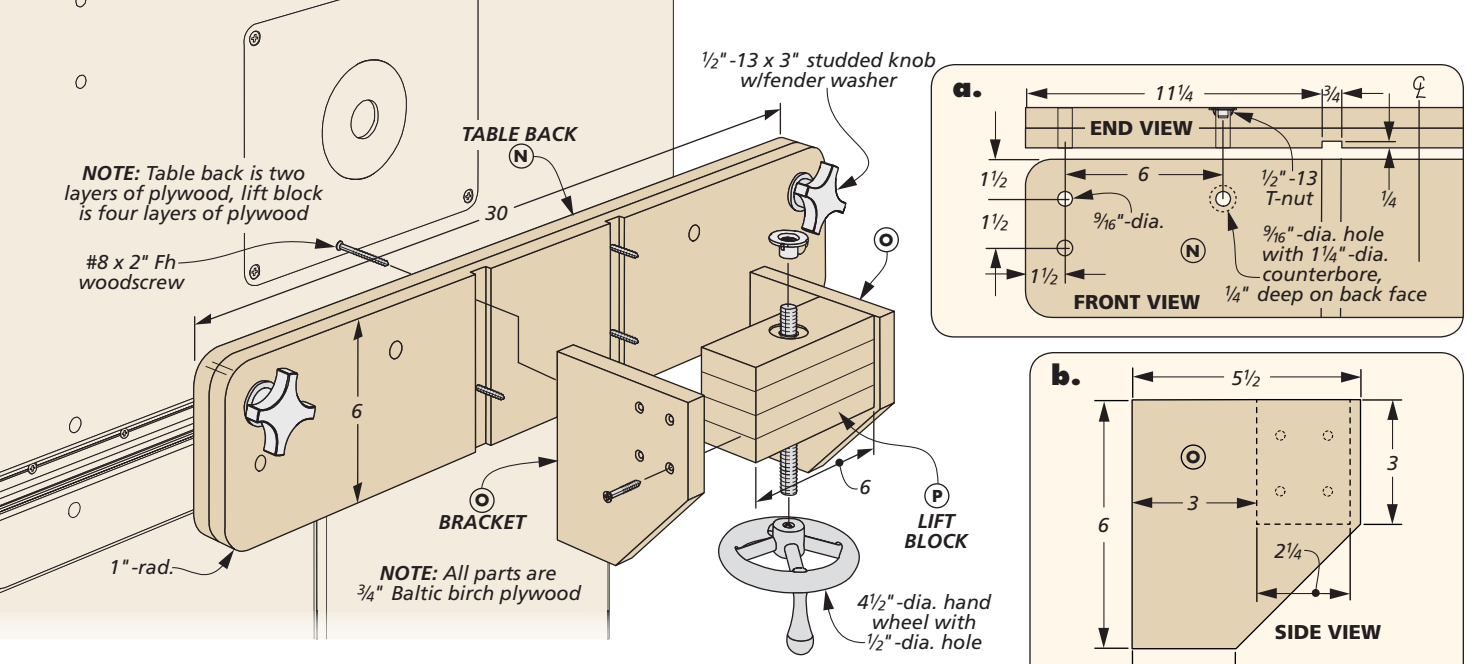
Make a Trammel. The two pivot holes in the trammel are used to shape the quadrant and cut the slot.



Ease the Edge. A slight roundover softens the edges of the quadrant and prevents splintering.



Reinforcements. Pocket screws augment the glue joint where the quadrant connects to the tabletop.



Adjustable horizontal TABLE

Completing the case and tabletop gives you a fairly standard router table. To take advantage of the flip-up top, there needs to be some kind of support for the workpiece. That's where you'll be focusing your attention next.

The horizontal table consists of two primary assemblies: a fixed back and an adjustable table. The back is used to mount the table to the vertical tabletop in one of two positions. This is done with the T-nuts that were installed earlier. A hand wheel lets you fine-tune the height of the table in relation to the router bit.

A SOLID BACK. The table back is made up of two layers of plywood. I softened the corners with a radius. Cut a pair of dadoes in the face to hold the hand wheel assembly, as shown in Figure 1 below. The dadoes are sized to match the thickness of the Baltic birch plywood used throughout this part of the project. The back has two sets of holes drilled in it, as shown in detail 'a.' One is used with studded knobs to lock into the tabletop. The other set incorporates T-nuts, as you can see in the upper right drawing. These secure the table height once you have it dialed in.

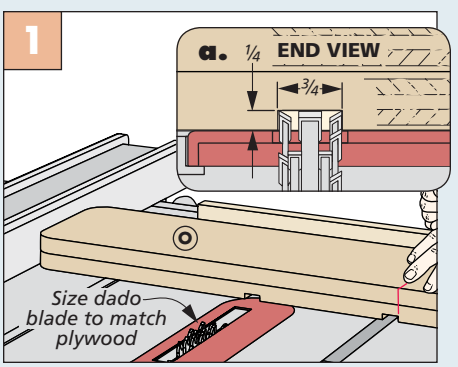
HAND WHEEL ASSEMBLY. Attached to the table back is the hand wheel assembly. This includes two brackets and a lift block. The brackets are cut from square blanks that have the lower corners beveled, as shown in detail 'b.' Besides lightening the look of the brackets, this detail provides greater access to operate the hand wheel. The brackets are glued into the dadoes in the table back and flush with the top edge. Screws driven in from behind further strengthen the joint (main drawing above).

Sandwiched between the brackets is the lift block (detail 'c'). It's glued up from four layers of plywood. Size the block so that it's a snug fit between the brackets.

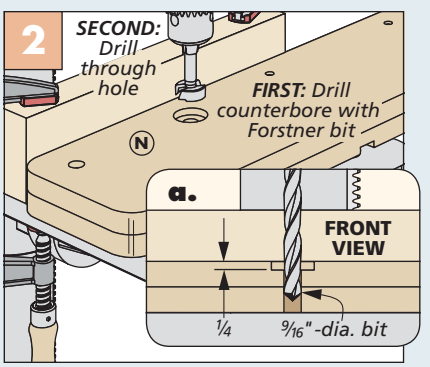
At the drill press, drill a counterbore for a T-nut and then the through hole to accommodate the threaded rod for the hand wheel. This is shown in detail 'c.' I drove long screws through the brackets and into the block for a solid connection.

The hand wheel is attached to a length of threaded rod using a set screw. Thread the rod into the T-nut in the lift block.

How-To: DADOES & COUNTERBORED HOLES



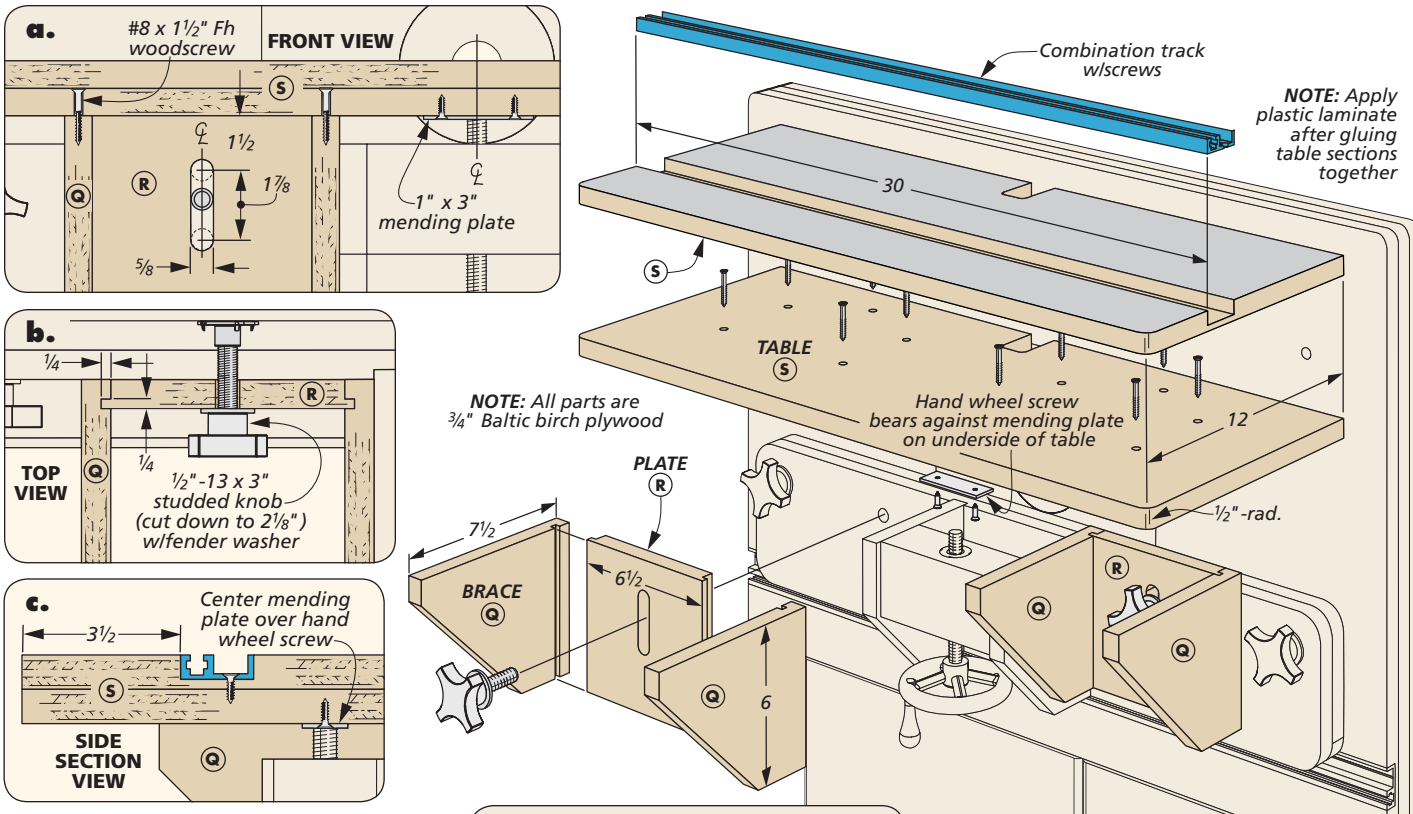
A Pair of Dadoes. The dadoes are centered on the overall length of the table back. The rip fence acts as a stop.



More T-Nuts. Drill the counterbore so that the head of the T-nut is just slightly below the surface.

ADJUSTABLE TABLE

The second part of the horizontal table is the adjustable portion, as shown on the next page. Here you have a double thickness table and two sets of braces with plates that join the table to the



back assembly. The construction is straightforward, but there's a definite order to the process to get the best results.

MAKE THE BRACE & PLATE. I began by making the two brace and plate sub-assemblies. The braces are similar to the brackets you just made (main drawing and detail 'e'). The difference is a tongue and dado joint that runs along the back edge, as illustrated in the drawing below. Locate the dado so that the back face of the mating plate is flush with the end of the brace, as you can see in detail 'b' above. Cut a rabbet along each side of the plate to form a tongue that fits into the dadoes in the braces. The other detail that you need to add is a centered slot, as shown in detail 'a.' This accepts a studded knob and washer. The knob threads into the T-nut in the table back.

NOW THE TABLE. A common theme with this project is creating strength by doubling up the thickness of critical components. And the top of the horizontal table is no exception. But I did things a little differently here. The table is screwed to the braces, but I didn't want the screws to show through the top face.

To do this, I cut the lower layer of the table to final size and shape, including the router bit notch, as shown in detail 'd.' Attach this layer to the braces with screws, as shown in the details 'a' and 'e.'

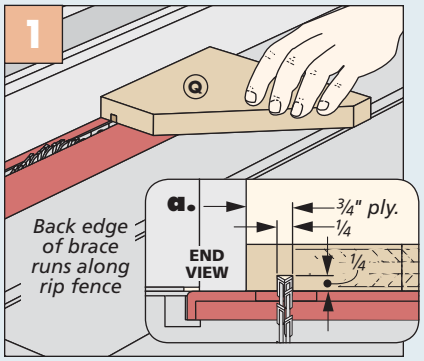
You know the routine by now: Once the first layer is in place, the second layer can go on. Like before, start with a slightly oversized piece. Cut a notch for the bit and use that to align the second layer over the first while you glue the upper layer of plywood in place.

Trim the second layer of plywood flush, then add the plastic laminate just as you did on the tabletop. (You'll have to remove the table from the tabletop to trim the edges flush.) Be sure to trim around the inside of the router bit notch, as well.

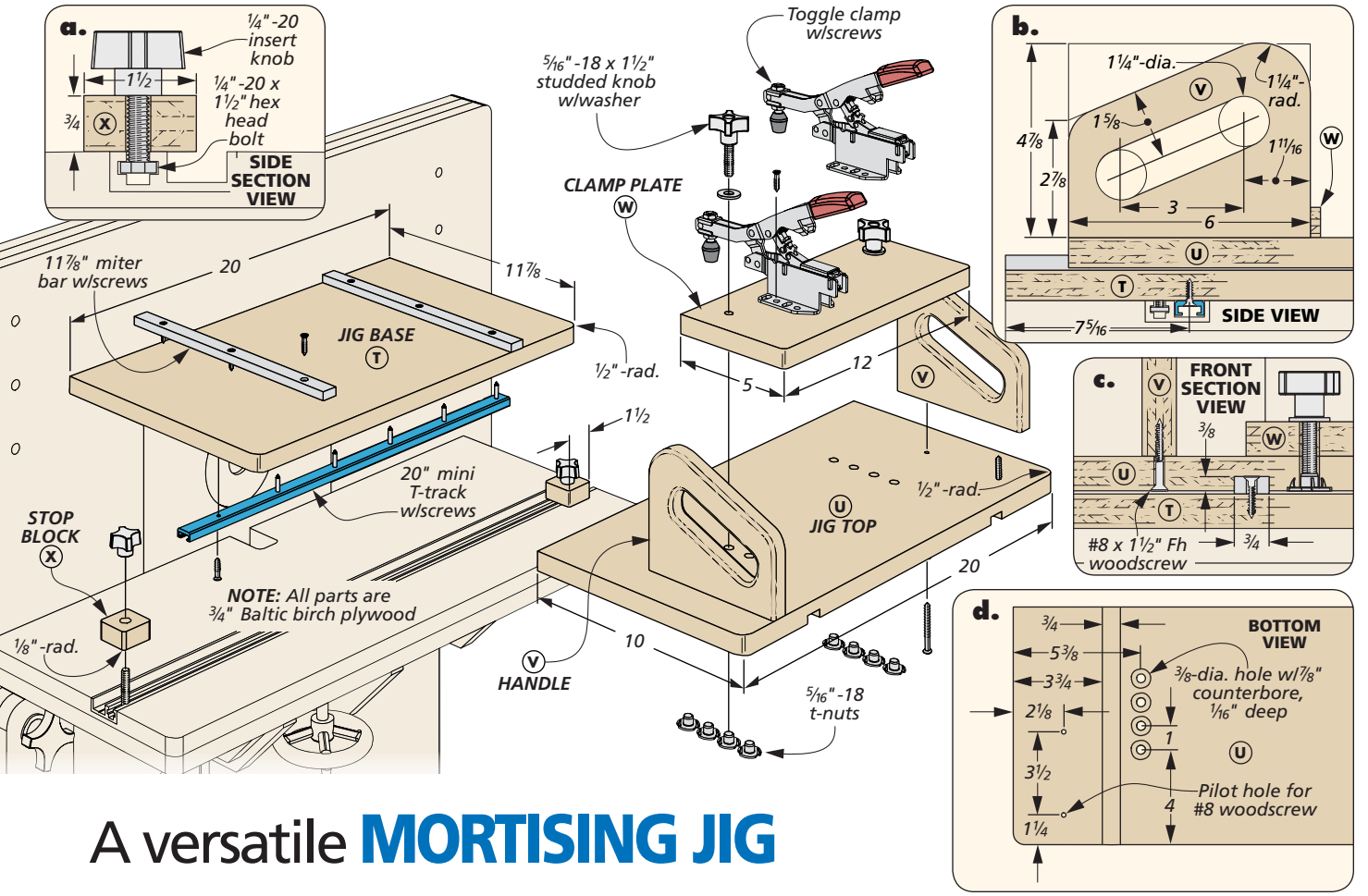
Complete the work on the top of the horizontal table by taking a trip over to the table saw. Here, you cut a groove to accept the same combination track that's installed in the main tabletop. You can find the location for the groove in detail 'e.'

There's one final bit of hardware to add to the table before reattaching it to the router table. And that's to attach a mending plate to the bottom face. This serves as the bearing surface for the hand wheel screw (main drawing and detail 'c').

How-To: DADO



Tongue & Dado Joint. The first step is cutting the dado. Then size the mating tongue for a snug fit.



A versatile **MORTISING JIG**

Routing mortises is an ideal operation for a horizontal router. In this configuration, you have much better visibility of the bit. What you need, though, is a way to secure and guide the workpiece while making the cut. The solution is the jig shown here.

The workpiece is clamped to the jig with stout toggle clamps. Runners in the base and top of the jig constrain the motion in and out and side to side. Stops installed in the table help make it easy to rout consistent mortises. And two large handles give you better control and keep your hands well clear of the bit.

THE BASE FIRST. The base is a piece of plywood. On the bottom face, a length of mini T-track serves as a runner, as shown in detail 'b.' What's important here is that it gets installed parallel to the edge of the base. This is what guides the jig side to side down the length of a mortise.

On the top face of the base are a pair of runners that I cut from a commercial miter bar, as you can see in detail 'c.' These mate with dadoes cut in the bottom face of the mortising jig top. The bars control the in and out motion of the jig when cutting a mortise to its final depth.

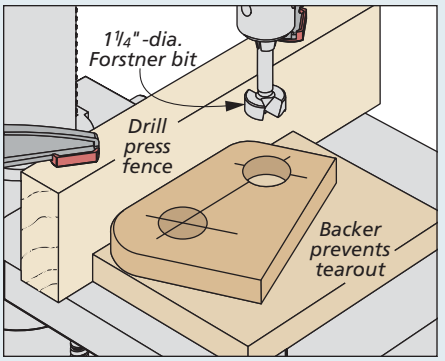
ADD THE TOP. In addition to the dadoes I just mentioned, the jig top has four sets of T-nuts installed in the bottom face. The T-nuts are anchor points for the toggle clamp assembly.

In detail 'b,' you can see the dimensions for the handles that are screwed to the jig top. You create the hand holds by drilling out the ends with a Forstner bit (box at left). After cutting away most of the waste with a jig saw, smooth and straighten the edges with files and a little hand sanding.

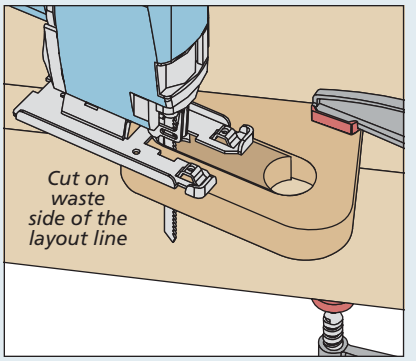
The toggle clamps are fixed to an adjustable plate. Depending on the size of your workpiece, you can locate the plate in one of four locations on the top using studded knobs and washers (detail 'c').

The last thing to do is make a pair of square stop blocks. These lock into the

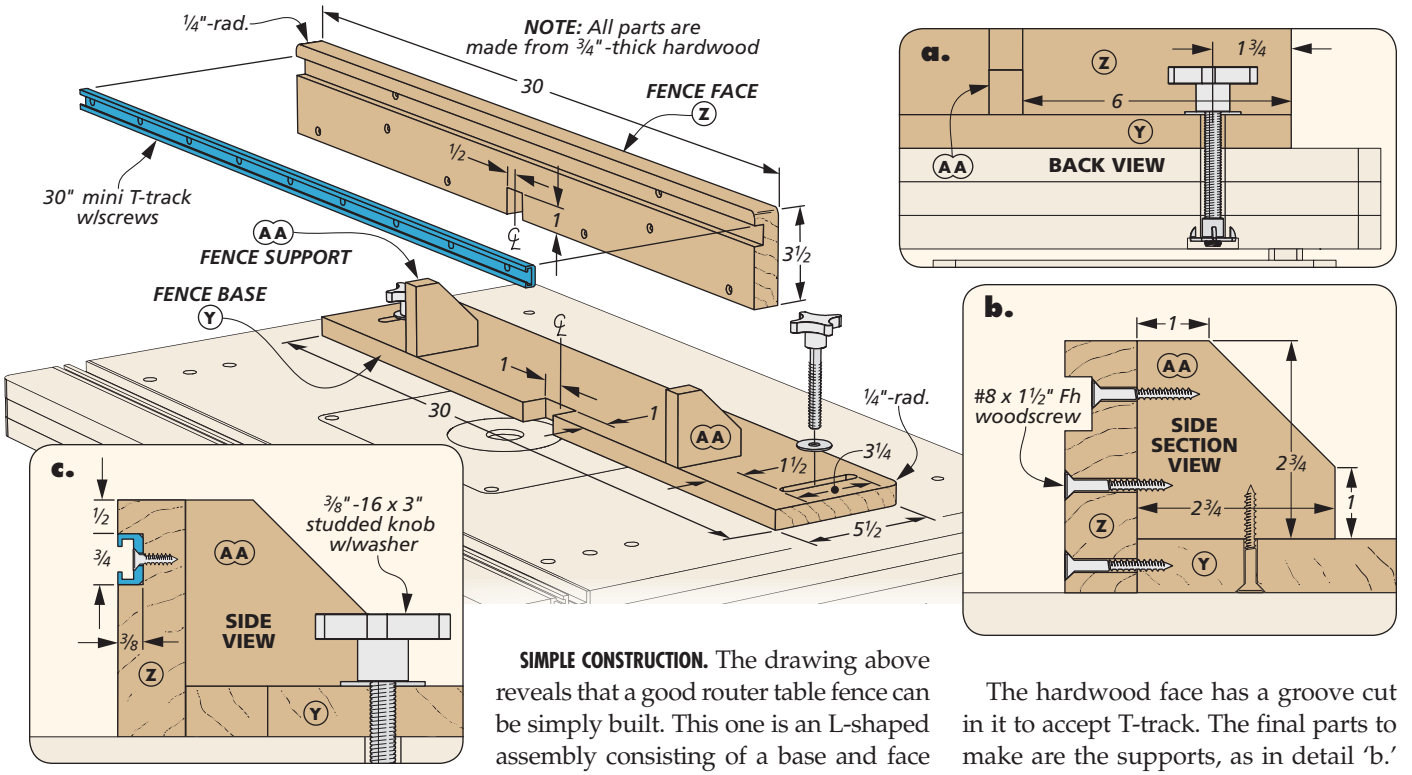
How-To: SHAPE A HAND HOLD



Drill out the Ends. Use a Forstner bit in the drill press to create a smooth radius at each end of the hand hold.



Rough out the Waste. A couple of quick jig saw cuts remove most of the waste between the holes.



T-track in the horizontal table with hex bolts, washers, and knobs, as shown in detail 'a' on the previous page.

ROUTER TABLE FENCE

The focus so far has been on making the horizontal routing configuration. But in order to use the standard setup, you'll need a solid, sturdy fence.

SIMPLE CONSTRUCTION. The drawing above reveals that a good router table fence can be simply built. This one is an L-shaped assembly consisting of a base and face beefed up with some supports.

The base is a length of hardwood with a centered notch to allow a router bit to be recessed inside. Near each end of the base is a short slot that's used to adjust the position of the fence in use. The fence is attached to the table with washers and studded knobs that thread into the T-nuts along the back of the tabletop, as shown in details 'a' and 'c.'

The hardwood face has a groove cut in it to accept T-track. The final parts to make are the supports, as in detail 'b.' Once they're cut to shape, the fence can be assembled with glue and screws. The key is keeping the fence face square to the base as the parts come together.

That wraps up the project, and the router table is ready for use. Be sure to locate the router table in a prominent place in your workshop. With all the practical features it has, it's bound to see a lot of use for years to come. W

Materials & Supplies

A	Case Sides (2)	¾ MDF - 15 x 33
B	Case Top/Bottom (2)	¾ MDF - 15 x 31
C	Case Shelf (1)	¾ MDF - 14½ x 31
D	Case Back (1)	¾ MDF - 19¼ x 31
E	Pedestal (1)	1½ MDF - 22 x 33
F	Outer Dividers (2)	¾ MDF - 13 x 14½
G	Inner Dividers (2)	¾ MDF - 13 x 15
H	Small Shelves (2)	¾ MDF - 6¼ x 14½
I	Upper Backs (2)	¾ MDF - 8 x 12¾
J	Lower Doors (2)	¾ MDF - 15 15/16 x 19¾
K	Upper Doors (2)	¾ MDF - 9 x 9⅛
L	Tabletop (1)	2¼ ply. - 24 x 34
M	Quadrants (2)	¾ ply. - 14 x 13⅝
N	Table Back (1)	1½ ply. - 6 x 30
O	Brackets (2)	¾ ply. - 6 x 5½
P	Lift Block (1)	3 ply. - 2¼ x 6
Q	Braces (4)	¾ ply. - 6 x 7½
R	Plates (1)	¾ ply. - 6 x 6½
S	Horizontal Tables (2)	¾ ply. - 12 x 30
T	Mortise Jig Base (1)	¾ ply. - 11⅞ x 20
U	Mortise Jig Top (1)	¾ ply. - 10 x 20
V	Handles (2)	¾ ply. - 4⅞ x 6
W	Clamp Plate (1)	¾ ply. - 5 x 12
X	Stop Blocks (2)	¾ ply. - 1½ x 1½
Y	Fence Base (1)	¾ x 5½ - 30
Z	Fence Face (1)	¾ x 3½ - 30
AA	Fence Supports (2)	¾ x 2¾ - 2¾

- (4) Magnetic Catches
- (2) ½"-13 x 3" Carriage Bolts
- (2) 1½" x 36" Continuous Hinges
- (6) ½" x 1¼" Fender Washers
- (14) #8 x 2" Fh Woodscrews
- (2) ½"x 2½" Steel Rods
- (2) ½"-13 Insert Knobs
- (1) Power Tool Switch
- (6) ½"-13 T-Nuts
- (6) ⅜"-16 T-Nuts
- (2) 36" Combination Tracks
- (1) Router Insert Plate
- (4) ¼"-20 Fh Machine Screws
- (4) ¼"-20 Threaded Inserts
- (8) #8 x 1¾" Pocket Screws
- (2) 48" Mini Tracks
- (2) ⅜"-16 x 3" Studded Knobs
- (2) ⅜" x 1" Fender Washers
- (36) #8 x 1½" Fh Woodscrews
- (1) 1" x 3" Mending Plate
- (2) #6 x ½" Fh Woodscrews
- (4) ½"-13 x 3" Studded Knobs
- (1) ½" x 4½" Hand Wheel
- (2) ½"-13 x 7" Threaded Rod
- (2) Toggle Clamps
- (2) 5/16"-18 x 1½" Studded Knobs
- (2) 5/16" Washers
- (1) ⅜" x ¾" - 30" Miter Bar
- (8) 5/16"-18 T-Nuts
- (2) ¼"-20 x 1¾" Hex Bolts
- (2) ¼"-20 Insert Knobs

ALSO NEEDED:
Two 49" x 97" sheets of ¾" MDF
Two 60" x 60" sheets of ¾" Baltic birch plywood
2.5 bd. ft. of ¾"-thick hard maple (parts Y, Z, and AA)

Heirloom Project

double Porch Rocker

With its solid construction and elegant design, this rocker is sure to be the most relaxing project you have ever built.

I grew up in a rural area in a time when summer nights were spent relaxing on the porch. Those nights of long conversations about anything and everything, plus the occasional impromptu visit from a neighbor, are precious memories.

With this classic-style rocker, you too can spend time relaxing on your porch, deck, or patio. It has ample space for one person to stretch out while reading a good book. But it's just the right size to cozy up to your significant other, kids, grandkids, or the family dog.

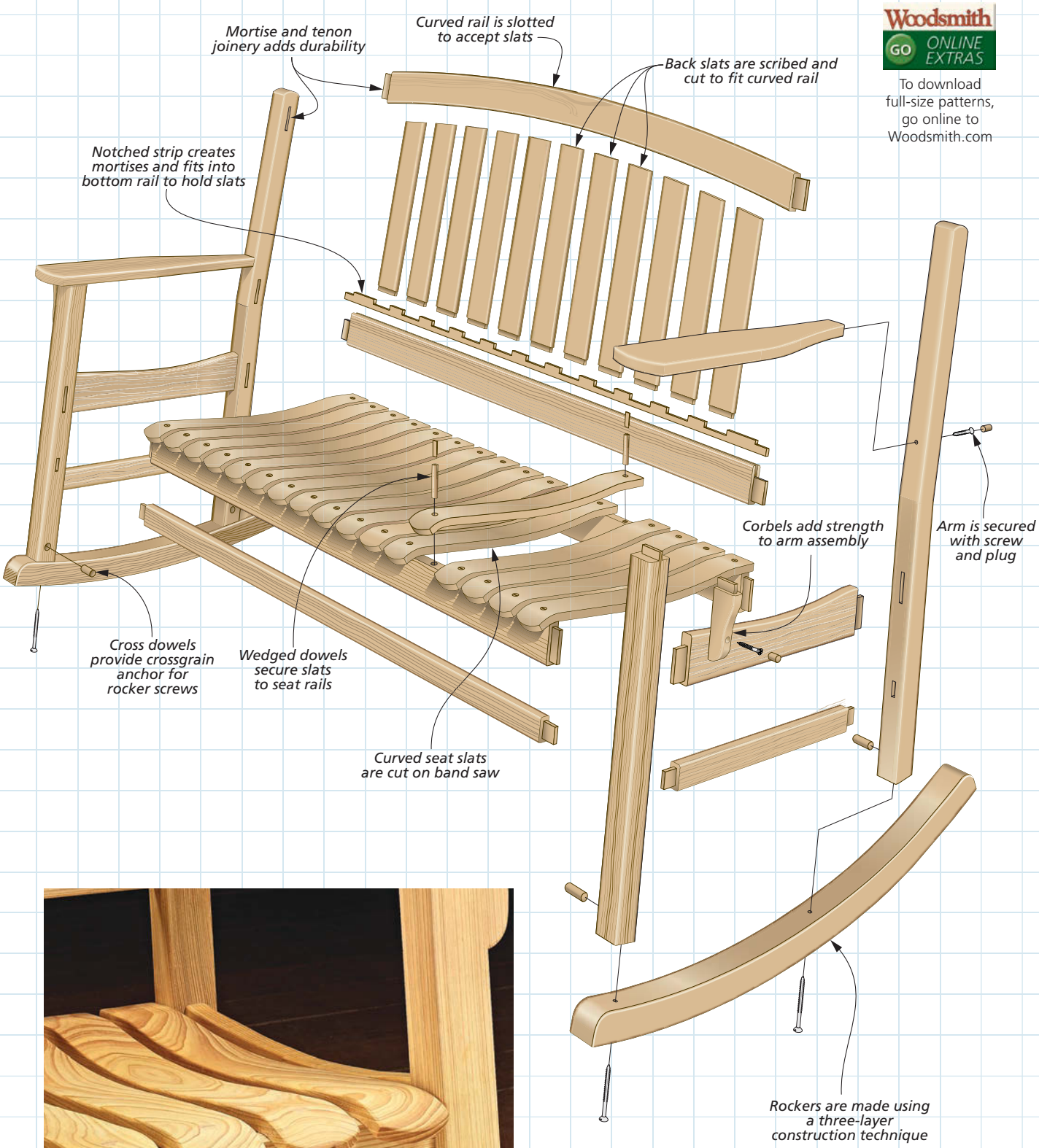
The woodworking presents enough of a challenge to make it an interesting build. Our designer, Ted Kralicek, spent a lot of time getting the shape of the rockers just right for easy, no-effort rocking.

The seat slats are curved for comfort. I'll show you how to make them using a pattern to lay out the shape before cutting them on a band saw using a jig.

Also, there's something unique about the way the seat slats are attached to the rails. Instead of screws, I used slotted dowels secured with thin wedges. This provides a long-lasting connection that will stay strong for years to come.

I chose to use cypress because it's an attractive, durable wood that's easy to work with power and hand tools. Plus, it's suitable for outdoor use. Read more about cypress by turning to page 10.

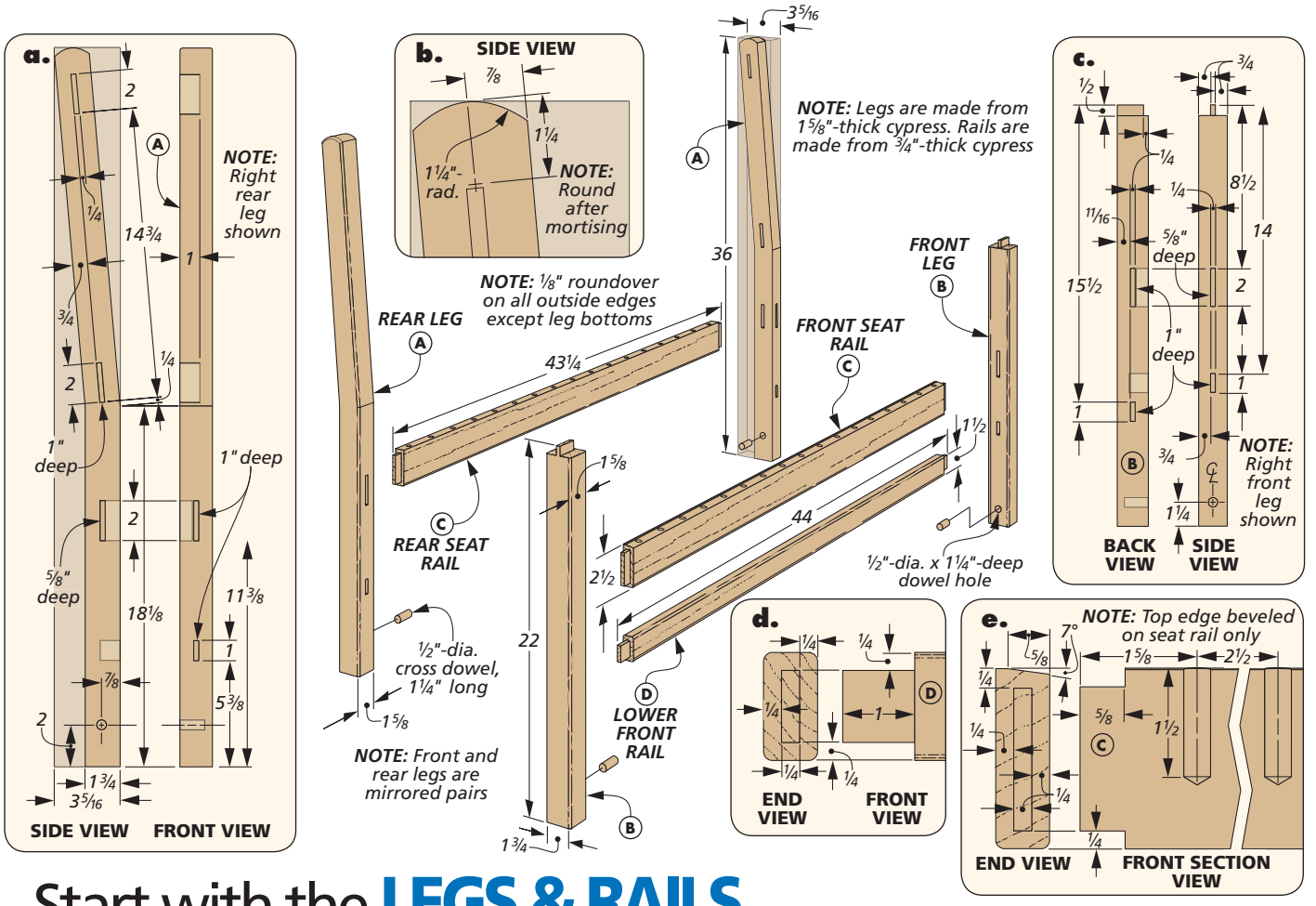
Construction Overview / OVERALL DIMENSIONS: 48⅞"W x 36⅝"H x 35½"D



Woodsmith GO ONLINE EXTRAS

To download full-size patterns, go online to Woodsmith.com

▲ Shaped slats make for a comfortable seat. The ends are curved to avoid digging into your legs as you rock. The slats are formed at the band saw.



Start with the LEGS & RAILS

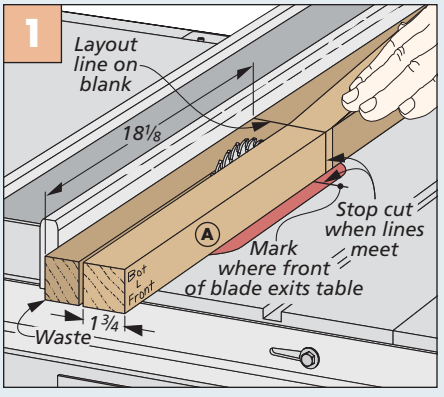
The construction of the rocker starts with the legs, seat rails, and lower front rail. But there's one thing I want to point out before you start: You won't assemble these components until after the seat and back are completed. For now, you'll just dry-assemble all of the parts to ensure a good fit for the rest of the assembly.

REAR LEGS. All four legs are cut from stock planed to 1⅝" thick. The upper portion of the rear legs is angled. This tilts the back of the rocker for comfort.

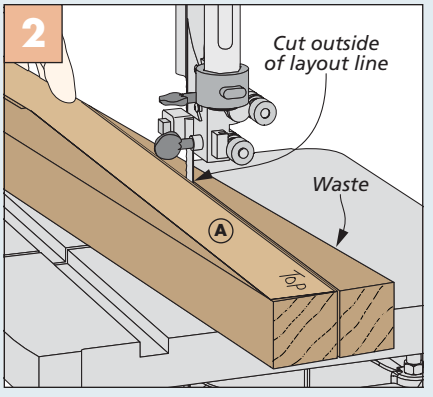
Detail 'a' above shows how the rear legs are cut from wide blanks. Some careful layout is in order here. You'll want to mark the top and bottom to keep the orientation correct as you cut the parts and lay out the mortises.

The box below shows the technique I used to ensure straight cuts. It starts by making a stopped cut at the table saw to define the width of the lower portion of the leg. The second cut takes place at the band saw to cut the inside face of the

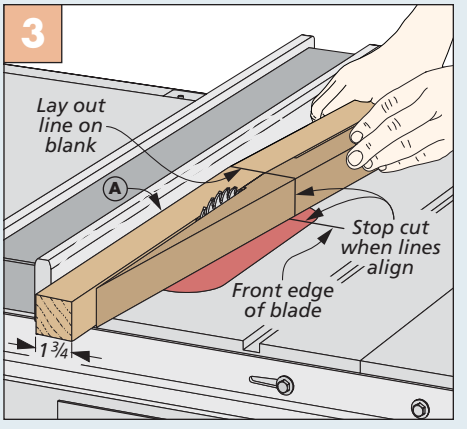
How-To: CUT LEG TO SHAPE FROM BLANK



First Cut. Mark where the blade exits the saw table. Then make a stopped cut to define the lower, straight portion.



Second Cut. Cut the inside face of the upper, angled portion at the band saw and then joint the face smooth.



Third Cut. Make another stopped cut to define the width of the top of the leg. Finish the cuts at the band saw.

upper, angled portion. After running this face across the jointer, head back to the table saw to make another stopped cut to define the final width of the upper portion of the leg. Complete both stopped cuts at the band saw to remove the waste. A little sanding is all that's required to create a smooth transition.

FRONT LEGS. The front legs are pretty simple to make. Cut them to width and form the tenon at the top end that will fit into a mortise in the arm of the rocker, as in Figure 1 at right. Be careful of the orientation here — the leg is 1⅝" wide across the front and 1¾" thick.

MORTISES. The legs require mortises to hold the rails, seat, and back. These are detailed in the drawings on the previous page and Figure 2 at right. Depending on the size of your drill press table, you may need to elevate the rear legs with a spacer to hold them level while drilling the front mortises.

CROSS DOWELS. The rockers are attached to the bottom ends of the legs. Screws don't hold well in end grain, so I added cross dowels for the screws to grab. Figure 3 shows how the holes are drilled.

Before moving on to the rails, round over the top end of the rear legs, as you can see in Figure 4. Then head to the router table to ease the edges.

A SET OF RAILS

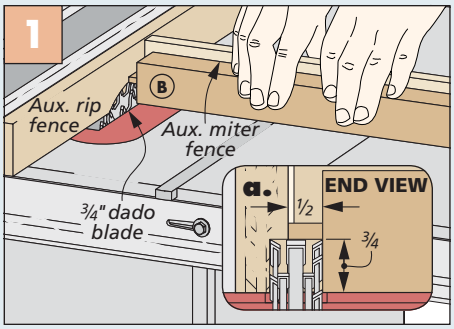
The two rails that hold the seat slats and the lower front rail follow a similar construction procedure at first. They all require a tenon on each end (Figures 5 and 6). Note that the overall size of the rails and tenon size differ between the lower front rail and the two seat rails.

DRILLING FOR DOWELS. Now focus your attention on the pair of seat rails. Each of the seat slats is held in place with a wedged dowel. You'll need 17 holes along the top edge of each seat rail (Figure 7). I placed the two rails side-by-side to lay out the hole locations.

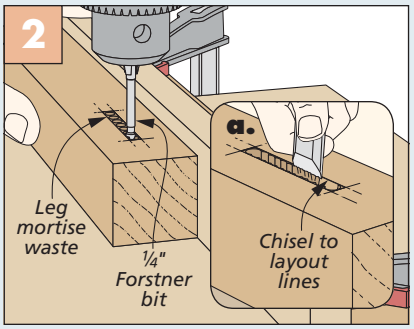
At the drill press, take time to adjust the fence to center the bit on the rail edges. A trick I use to do this is to lower the bit until it makes a dimple, then rotate the workpiece 180° and repeat the process until the dimples align.

BEVEL RIP. The final step is to slightly bevel the top edge of the front rail (Figure 8). This allows the curve on the seat slats to fit tightly against the rail.

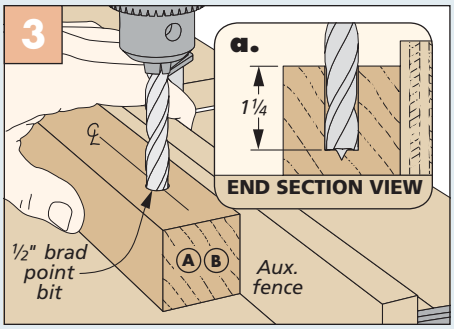
How-To: TENONS, MORTISES & DOWEL HOLES



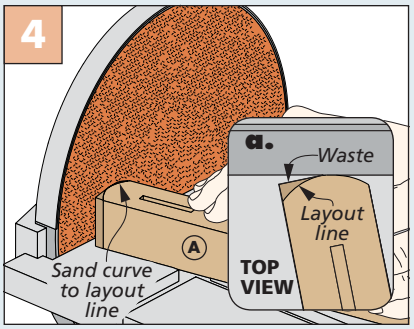
Short Tenon. The tenon at the top of each front leg helps to secure the arms of the rocker that you'll add later.



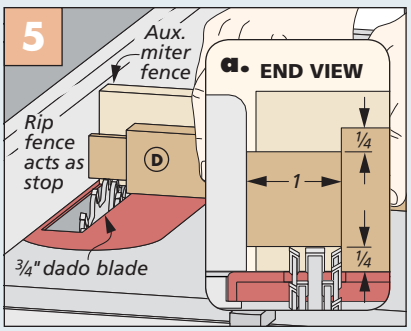
Making Mortises. Drill overlapping holes and then cleanly define the mortise with sharp chisels.



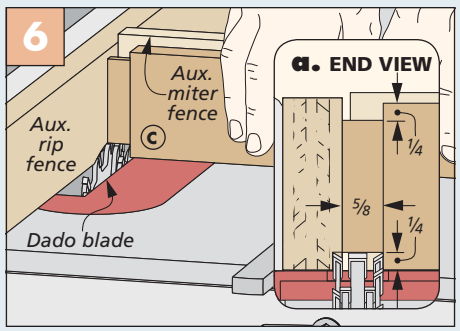
Cross Dowels. Each of the legs requires a hole for a dowel on the inside face. After drilling, glue the dowel in place.



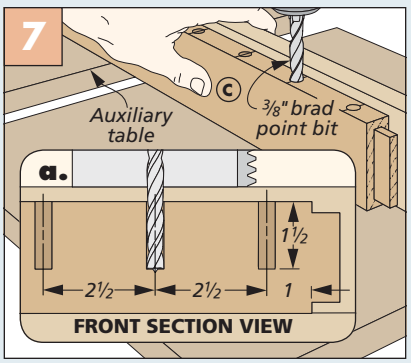
Smooth Shape. Lay out the curve at the top of the rear legs, then use the disk sander to shape them.



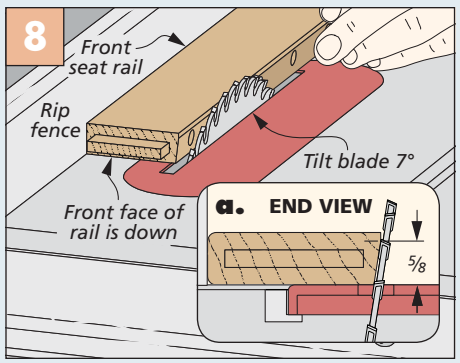
Lower Rail Tenons. The tenons on the lower front rail help add strength to the rocker assembly.



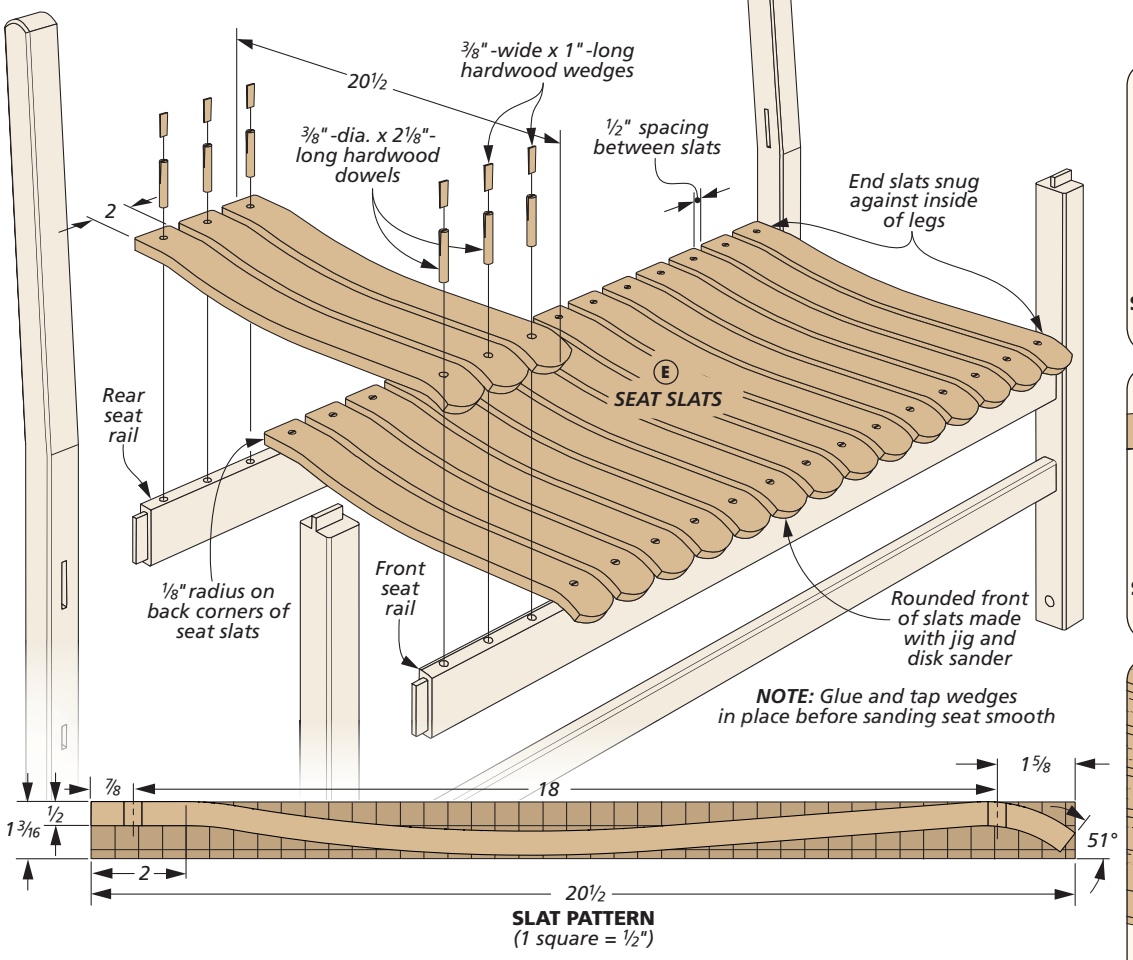
Tenons on Seat Rails. The tenons on the seat rails provide a strong connection to the legs of the rocker.

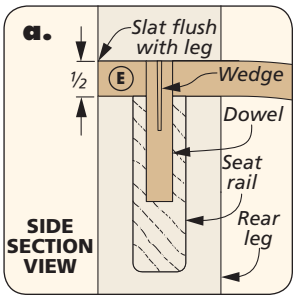


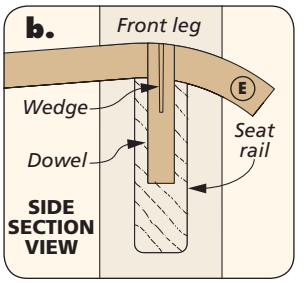
Dowel Holes. Carefully lay out and drill holes for dowels centered along the top edge of each seat rail.

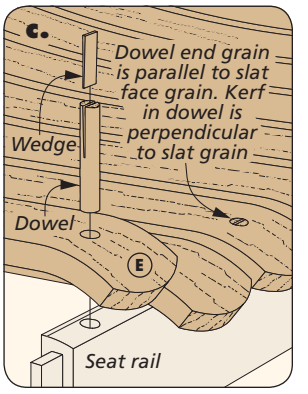


Beveled Edge. To allow the curved seat slats to fit tightly to the front seat rail, rip a slight bevel along the top edge.









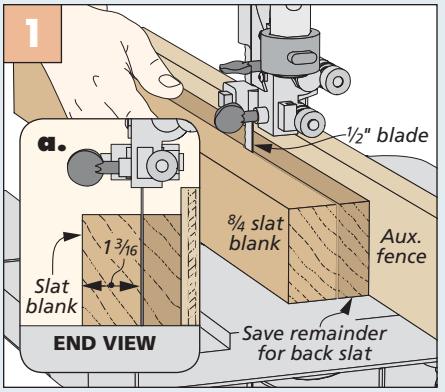
Building the SEAT ASSEMBLY

So far, you've made all of the parts that form the frame for the rocker. But before you can glue them up, you'll need to add a seat and back assembly. There's quite a bit of work to do at the band saw, so make sure you have a sharp blade.

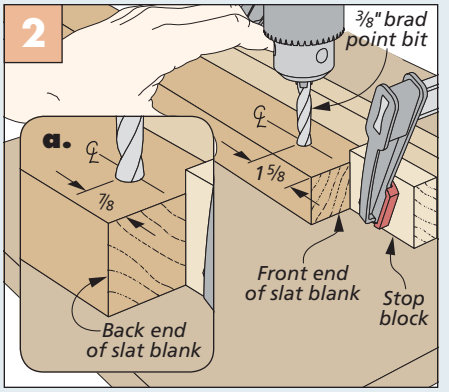
BAND SAW WORK. To make the seat slats, I started with 8/4 cypress blanks a little over 2¼" wide. From these blanks, resaw strips roughly 1 3/16" thick to create blanks for the curved seat slats (Figure 1 below). What's left over will be used later to make the slats for the back of the rocker. Set those aside for now.

Rip each of the seat slats to their final width and then lay out the hole locations at each end of the blank (details 'a' and 'b' and slat pattern above). Each of the slats will be secured to the rails with a pair of wedged dowels. It's important that the holes for these dowels be drilled accurately so everything fits well during glueup. For this reason, I used stop blocks on the fence to accurately position

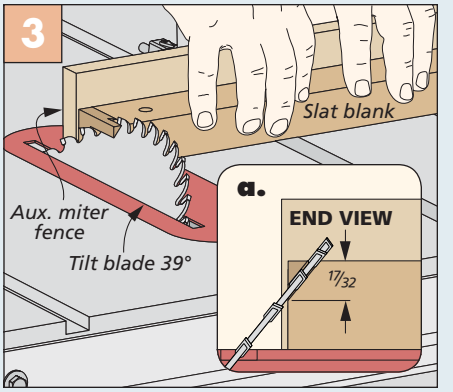
How-To: PREPARE SEAT SLAT BLANK



Resaw the Slat Blank. After resawing to create the blank for the seat slat, save the remainder for the back slat.



Drill Dowel Holes. Dowels secure the slat to the seat rails and also hold the blanks on the jigs used to form the slat.



Bevel One End. To make it easier to sand the rounded end of the slat later, cut a small bevel on each blank.

the holes on each of the blanks, as shown in Figure 2 on the previous page.

The next step is to cut a bevel on one end of each blank, as in Figure 3, previous page. This makes it easier to round over the end of the slat after it's cut to shape.

SHAPING JIGS. Shaping the seat slats comes next. Figures 1 through 3 at right show a couple of jigs I made to lend a hand with this task. You can read more about them in Shop Notes on page 64.

Before you can do any shaping, make a ¼"-thick hardboard template to trace the side profile onto the blank. The slat pattern is illustrated on the previous page. A full-size pattern can be downloaded online from *Woodsmith.com*.

Figure 1 illustrates how a two-sided holding jig secures the slat blank on a pair of dowels. After cutting what will become the top side of the slat, move the blank to the opposite, shaped side of the jig. Cut the bottom profile of the slat before sanding it smooth with a sanding drum using the same jig (Figure 2).

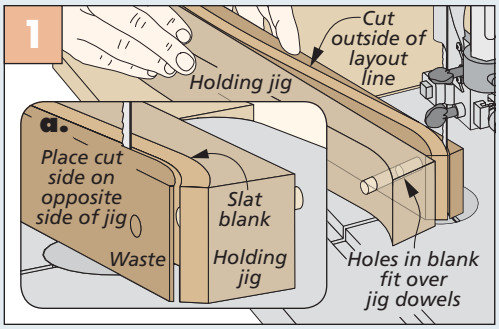
SANDING JIG. Another handy jig is one that helps hold the slat at the proper angle to shape the front end. You can see what I mean in Figure 3. The slat is held in place with dowels. After marking the curved profile using a posterboard pattern, I used a disc sander to sand to the line. Shop Notes on page 64 talks more about the pattern and jig.

DOWELS & WEDGES. To secure the slats to the seat rails, I used dowels with wedges. The jig shown in Figure 4 is used to both cut the dowels to length and create the slots for the wedges (Figure 5). Take care to orient the dowel to cut the slot perpendicular to the grain. This helps to avoid splitting the dowel when inserting the wedge.

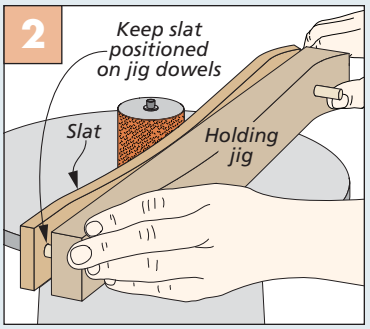
To make the wedges, I cut angled slots in a piece of maple with the grain oriented vertically, as illustrated in Figure 6. After cutting the strips, score the cut lines with a knife and snap the wedges free.

SLAT ASSEMBLY. Finally, you're ready to install the slats onto the seat rails. I used a jig to hold the rails secure during the process. You can find out more details about the jig in Shop Notes on page 65. When gluing the dowels, orient the slot parallel to the rails to avoid splitting the slats (Figure 7 and detail 'c'). Then glue and tap the wedges in place before sanding the entire surface of the seat smooth.

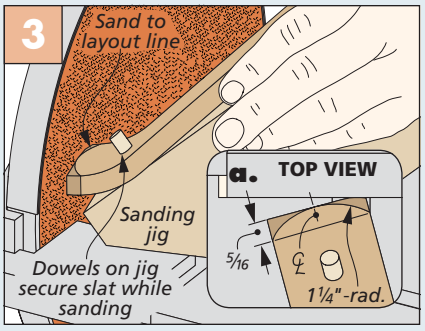
How-To: PROFILE SLATS & ASSEMBLE THE SEAT



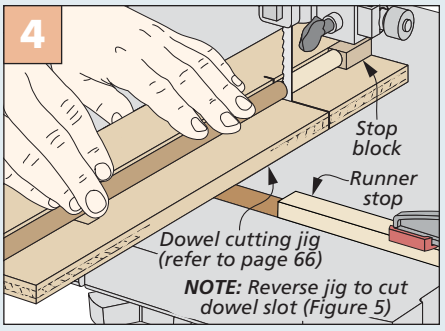
Band Saw Work. Use a holding jig to guide the slat blank when cutting each side of the slat to the profile lines that define the shape.



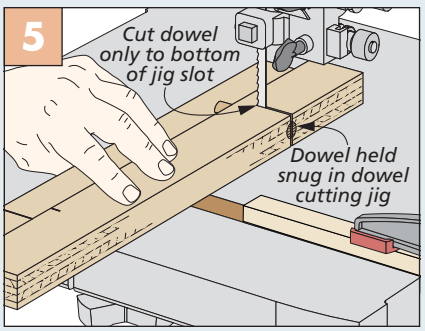
Smoothing. A spindle sander is ideal for smoothing the top and bottom of each slat.



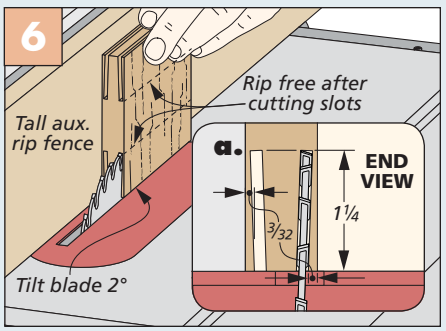
Rounded Ends. Use a jig to hold the slat at the proper angle to round over the end at the disc sander.



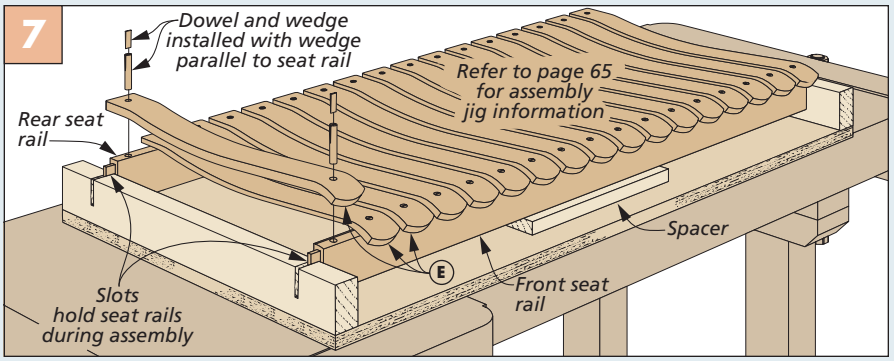
Cut & Slot Dowels. One jig takes care of cutting dowels to length and creating a slot for the wedges.



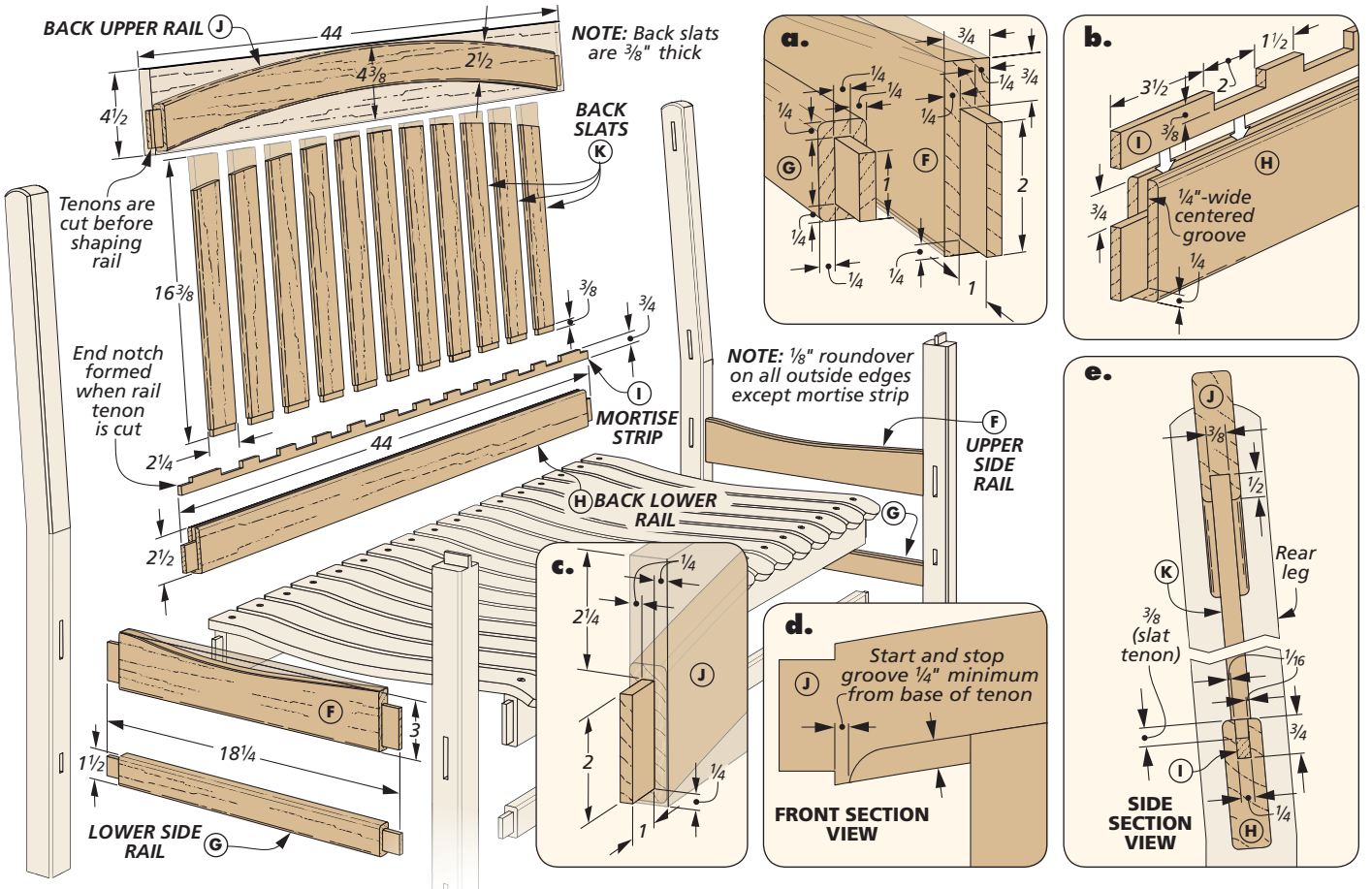
Grain Orientation. Cut the slot perpendicular to the grain direction on the end of the dowel.



Wedge Blanks. Cut angled slots in a blank first, then rip the strips free before trimming the wedges to width.



Seat Assembly. A simple assembly jig cradles the seat rails as you install the slats. Add glue to the hole in the seat rail and orient the slot on the wedges parallel to the rail while tapping them in place. Secure the wedges with glue.



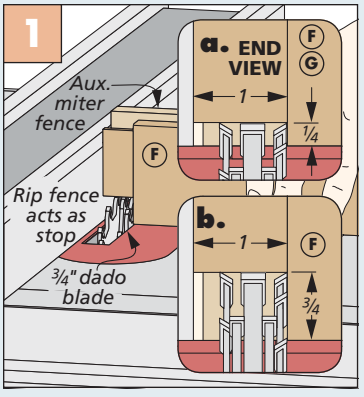
Add the BACK & SIDE RAIL ASSEMBLIES

Connecting the front and rear legs of the rocker with a pair of rails comes next. Then you'll work on making the seat back. The back and the seat you just completed are the two main structures that connect the leg assemblies. Once these are done, you'll be ready to assemble the main components of the rocker.

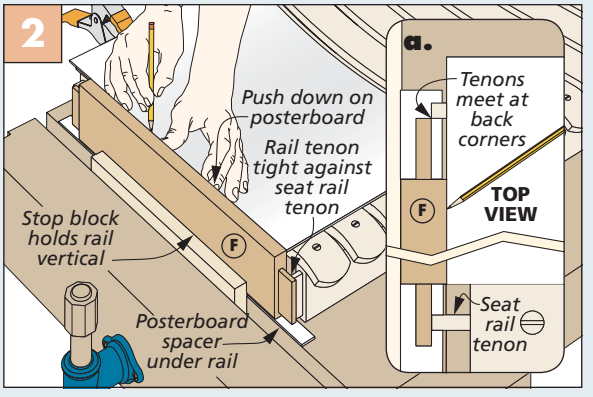
SIDE RAILS. If you take a look at the drawings above, you'll see the two side rails that connect the front and rear legs. The upper rail has a profile along the top edge that aligns with the slat contour.

The How-To box below steps you through the process of making the upper rails. First, you'll cut the tenons on the ends of the upper rails at the table saw. To mark the seat profile on the side of the rail, position it against the seat assembly, as in Figure 2. I used a piece of posterboard placed on the seat slats to serve as a guide to transfer the profile to the rail. Cut the profile at the band saw (Figure 3) and then round over the edges.

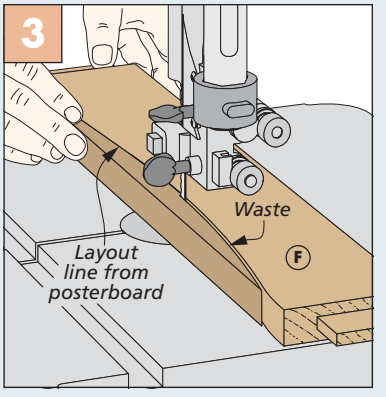
How-To: MAKE THE UPPER SIDE RAILS



Tenons. Start by cutting the side rail tenons. Note that the tenons on the upper rail are offset.



Inexpensive Template Trick. To conform to the shape of the seat slats, use a piece of posterboard. Trace the slat profile onto the upper rail.



Cutting to Shape. Trim the upper rail to shape and then sand the profile smooth.

LOWER SIDE RAIL. Making the lower side rail is simple by comparison. All you need to do is cut the tenons on each end and round over the edges.

LEG ASSEMBLIES. At this point, you can glue the side rails to their respective front and rear legs. This creates two end assemblies you'll use to dry-fit the seat and back assemblies as you go.

SEAT BACK ASSEMBLY

The How-To box on the right provides the details on creating the seat back for the rocker. The lower rail has a groove along the top edge that houses a mortise strip, as you can see in Figure 1. This strip is simply notched to form mortises that secure the bottom end of the back slats, as shown in Figure 2. I cut the tenons on the ends of the rail after the mortise strip was glued in place.

CURVED RAIL. The curved upper back rail starts out as a wide blank. The first step is to cut a tenon on each end, as in Figure 3. I used a strip of hardboard to lay out the curves before cutting the rail to shape at the band saw (Figures 4 and 5).

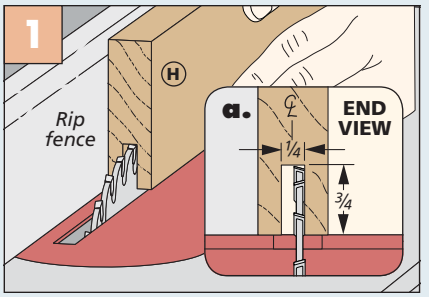
I cut a groove in the bottom edge of the curved upper rail to secure the upper end of the back slats. Figure 6 shows how a slot cutter in the router table is ideal for this task. Rout the slot in two passes, flipping the workpiece between passes to center the slot along the edge.

BACK SLATS. The slats for the seat back are made from ⅜"-thick stock. They're cut extra long so you can trim them later to match the curve in the upper rail. Cut a tenon on one end of each slat to fit the mortises in the bottom rail (detail 'e').

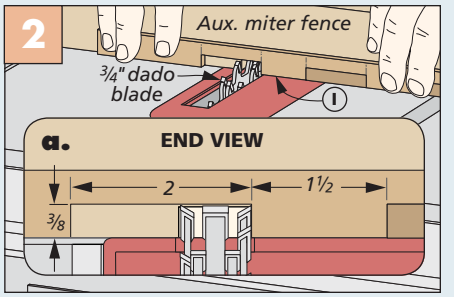
ONE MORE ASSEMBLY JIG. To help align the slats and rails during glue-up, I made a simple assembly jig (Figure 7). You can see in Figure 7a how a 7/16"-thick spacer positions the upper rail to serve as a guide to mark the curved cut lines at the top of each of the back slats. This accounts for the extra length needed to glue the slats into the groove in the upper rail. Then you can step over to the band saw to cut each slat to length.

Before gluing up the back assembly, remove the spacers from the jig. Add glue in each mortise in the lower rail and at the top of the slats before clamping. Once the glue dries, dry-fit the seat and back assemblies to the leg assemblies to check the fit before applying glue and clamps.

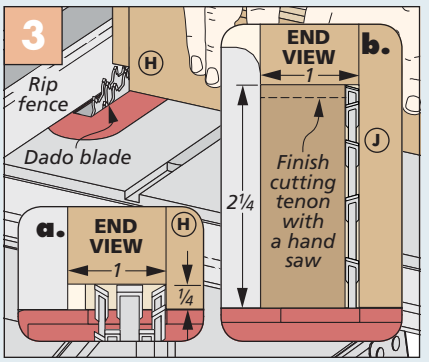
How-To: CREATE THE SEAT BACK ASSEMBLY



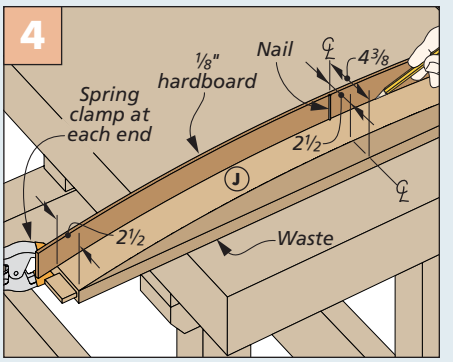
Centered Groove. To center the groove, make two passes, flipping the workpiece between passes.



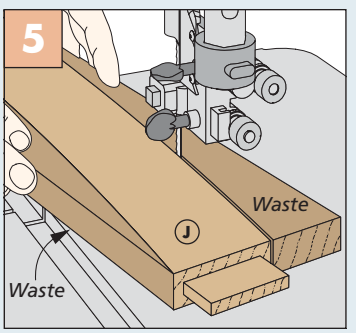
Notched Mortise Strip. Carefully lay out the notches before removing the waste with a wide dado blade.



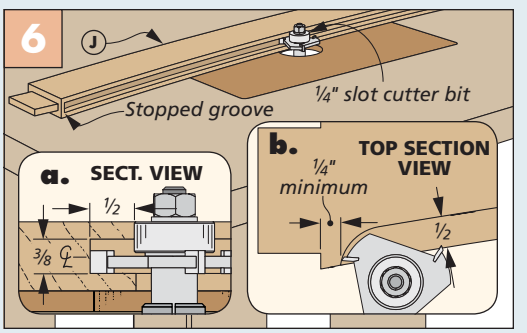
Tenons. Cut the tenons on the upper and lower back rails. Finish the tenon on the upper rail with a hand saw.



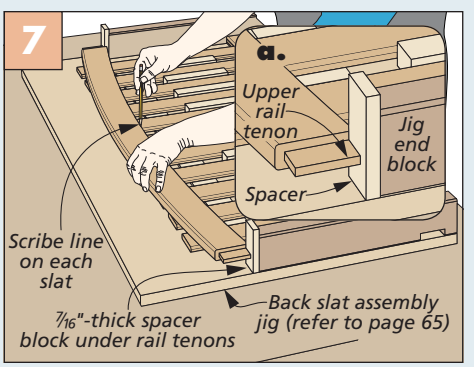
Curved Rail. Use a strip of hardboard to lay out the curves at the top and bottom edges of the upper rail.



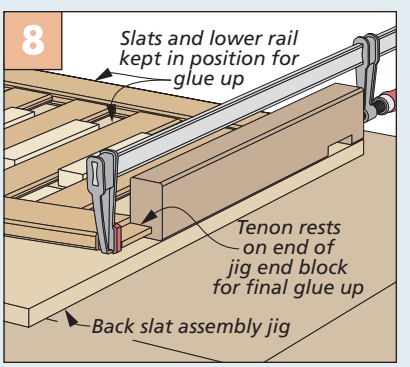
Cut & Sand. Cut the upper rail to shape at the band saw and then sand the curves smooth.



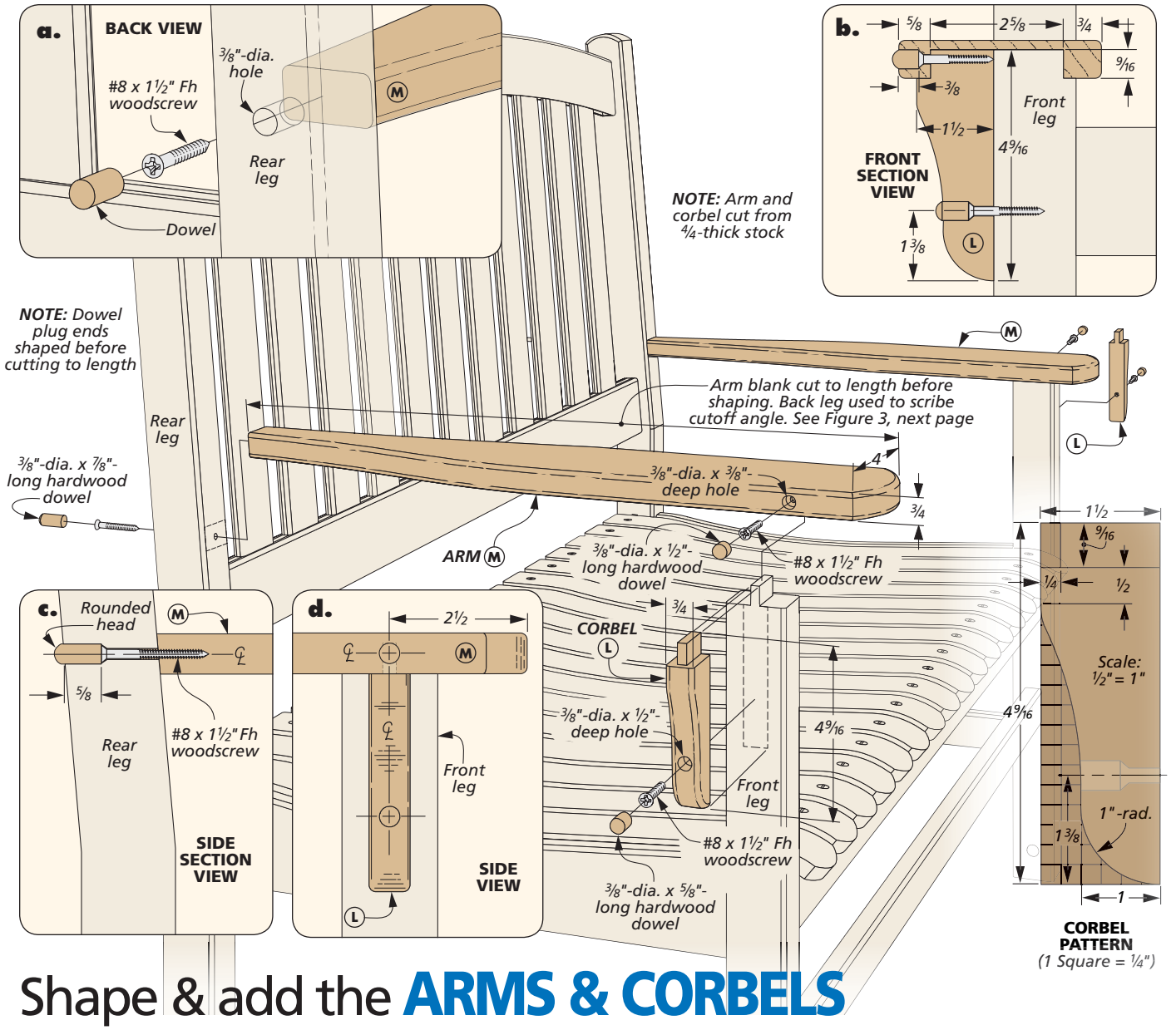
Cutting a Curved Groove. Make two passes with a slot cutter to create a centered groove. Flip the workpiece between passes.



Scribing. Use the upper rail as a guide to mark the cut lines on the back slats. Use a spacer to correctly position the rail.



Assembly. The assembly jig properly spaces the rails and slats to aid glueup and clamping.



Shape & add the ARMS & CORBELS

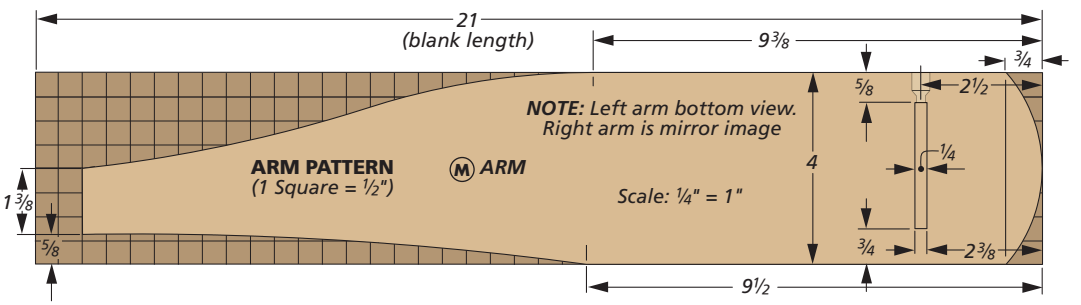
The main structure of the rocker is complete. Now you're ready to finish up by adding the arms, corbels, and rockers.

WIDE, SHAPED ARMS. The arms for the rocker are extra wide. But cutting them to shape is done after the the joinery is cut. You'll also need to cut the blanks to final length to fit the rocker before heading over to the band saw.

The pattern below shows how the blank is cut to width but left a little long. This is so you can scribe the cut line at the seat back for a perfect fit.

REINFORCED MORTISES. Figure 1 on the next page shows how to cut a mortise on the bottom face of each arm blank. This matches up with the tenon on the top of the front leg. A tenon on the corbel also fits into this mortise to provide additional strength. Then, to reinforce this connection, drill a counterbored hole on the outer edge of the arm for a screw and plug you'll add when installing the finished arm on the rocker (Figure 2).

CUTTING & SHAPING THE ARM. Figure 3 gives you an idea on how to cut the back end of the arm to fit the angle of the seat back. The important things to keep in mind is that the mortise should align with the tenon on the leg and the arm should be square to the leg. To accomplish this last goal, I used a couple of spacers to support the front and back ends of the arm. Then it's a simple matter of scribing the line where the arm and seat back intersect. Use this line as a guide to set the angle of the saw blade before cutting each of the blanks to length. You can see this illustrated in Figure 4 on the next page.



While you have the arm positioned, project a centerline from the edge of the arm around the back of the seat back. Drill a counterbored hole for the screw and plug used to secure the arm, as shown in detail 'c' on the previous page. Keep the bit parallel with the arm as you drill through the seat back.

SHAPING AT THE BAND SAW. A little band saw work is required to cut the arms to the final shape shown in the pattern at the bottom of the previous page. The technique I used was to stack the parts with the mortises facing out. Double-sided tape keeps the blanks from slipping as you cut out the shape.

There's another technique you could call on, especially if you're making more than one rocker. And that's to use a template at the band saw. For more on this technique, see the article on page 16.

All that's left to do on the arms is sand and round over the edges. You don't need to round the edges where the arm connects to the seat back. I held off on attaching the arms until the corbels were made and in place.

CORBELS. A corbel on the outside face of each front leg provides additional bearing surface for the wide arms and adds glue surface for joint strength. Figure 6 provides the details for cutting the tenon on the corbel blank.

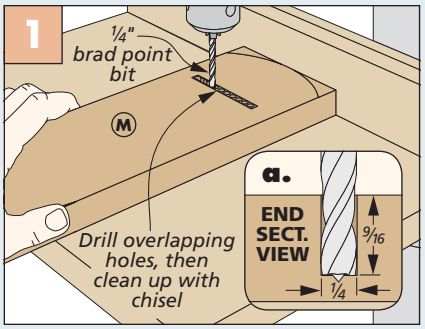
Shaping the corbels follows along the same lines as the arms: Drill a counterbored hole for a screw and plug, stack the parts, and cut them to shape (Figure 7). Sand them smooth before rounding over the outside edges.

ARM ASSEMBLY. With the arms and corbels at hand, now is a good time to dry-fit the parts. This is your last chance to make sure the arms seat all the way on the tenons on the legs and corbels. After making any necessary adjustments, attach the corbels to the front legs using glue and screws. Use the arm to help locate and hold the corbel in position as you drive the screw through the edge.

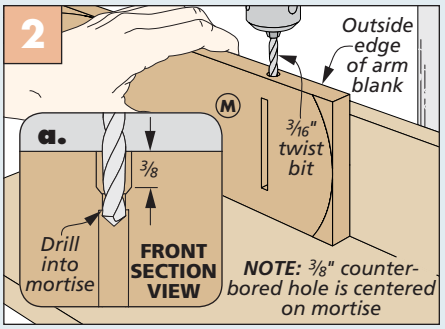
Secure the arm to the front leg and corbel with glue and drive the screw through the outside edge to secure it. And you can fasten the back of the arm with a screw through the seat back.

The last step is to plug the screw holes. Figure 8 shows how I rounded over the plug ends with a sanding block before cutting them to length.

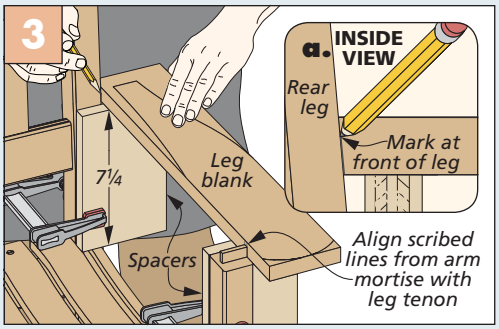
How-To: SHAPE THE ARMS, CORBELS & DOWELS



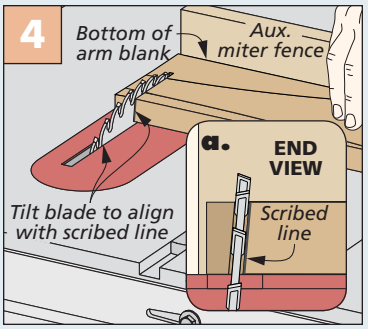
Mortises. Cut mortises in the bottom face of each arm to fit over the tenon on the legs and corbels.



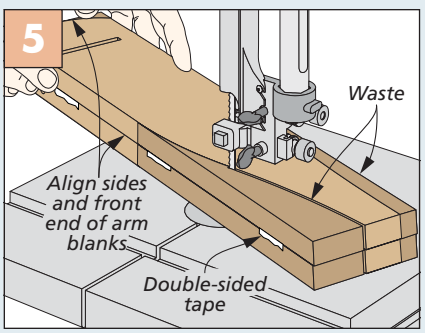
Reinforcement. A screw adds strength to the joint. Drill a counterbored hole in the edge for the screw and plug.



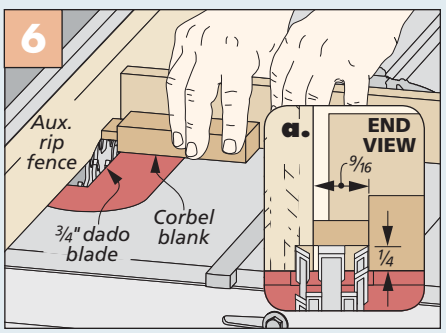
Scribing the Length. Support the arm on a couple of spacers before scribing the cut line at the back of the arm.



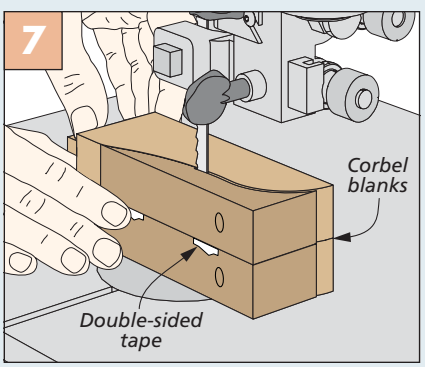
Cut to Length. Use the scribed lines as a guide to cut the arm to final length at the table saw.



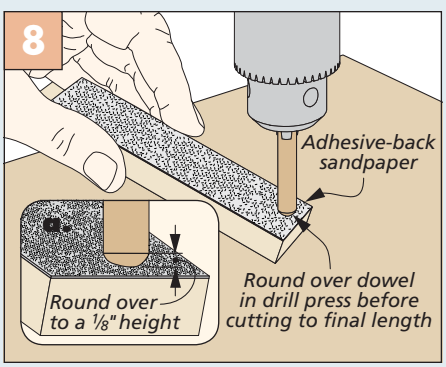
Shaping. Fasten the parts together with double-sided tape (with mortises facing out), and then cut to shape.



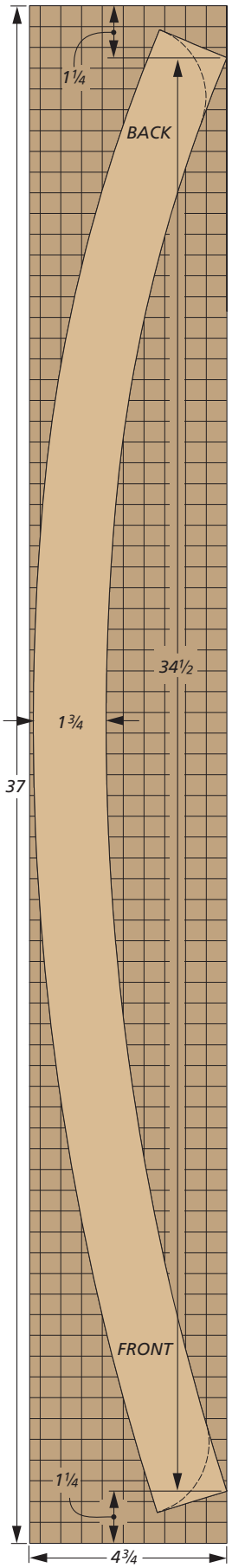
Corbel Tenons. Cut the corbel blanks to final size then cut the tenon on the end to fit the mortise in the arm.



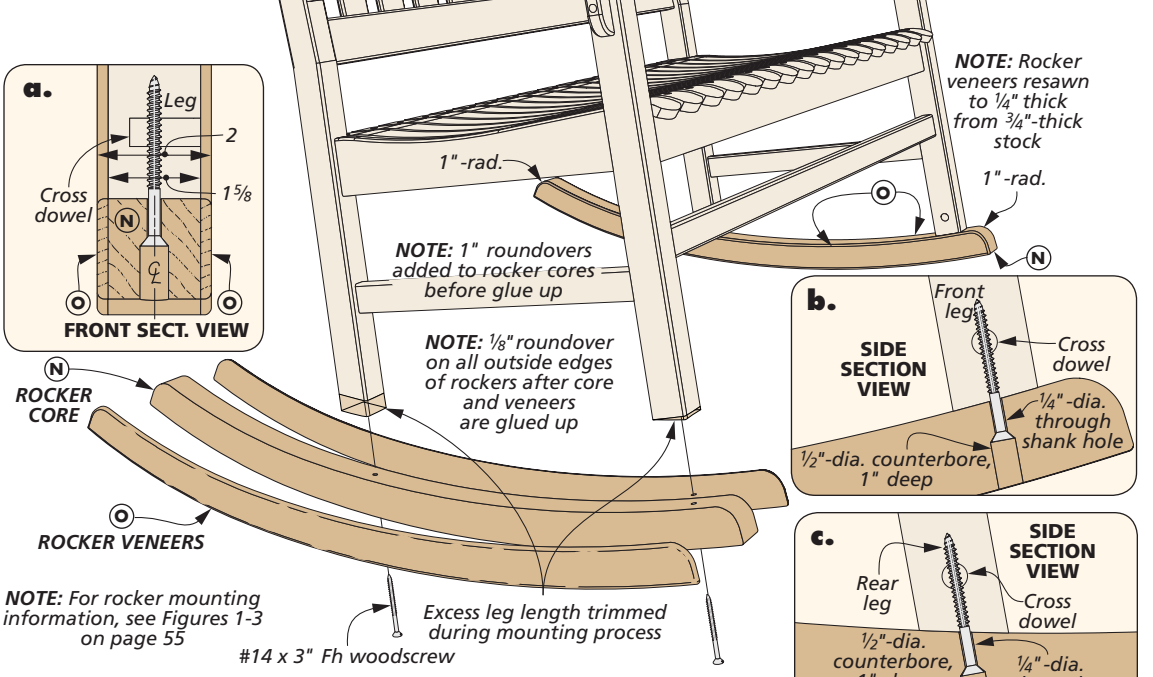
Shaping the Corbels. After drilling the counterbored screw holes, stack the parts to cut them to shape.



Rounded Plugs. Chuck an extra-long piece of dowel in the drill press to shape the end with files and sandpaper.



ROCKER PATTERN
(1 square = ½")



Completing the ROCKER

If building this rocker were a race, you'd be rounding the final curve, so to speak. All that's left to do is add the most important parts — a pair of rockers.

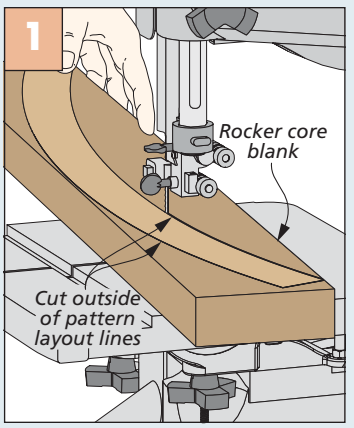
LAYERED CONSTRUCTION. The first thing you'll notice in the drawing above is that each rocker is made up of a core layer and two outside veneer layers. There's a good reason why I went this route. Adding the veneer layers helps strengthen the rocker. I purposely cut the veneers with a slightly different grain direction than the main rocker core. This, plus the glue, reinforces the rocker "sandwich."

CUTTING & ASSEMBLING THE PARTS. The rocker core and veneers are both cut from wide blanks using the pattern at left. But there's one thing I need to point out. The shape of the rocker isn't a symmetrical curve. There is a front and back, so it's helpful to mark the ends so you'll be sure to install them in the proper orientation later.

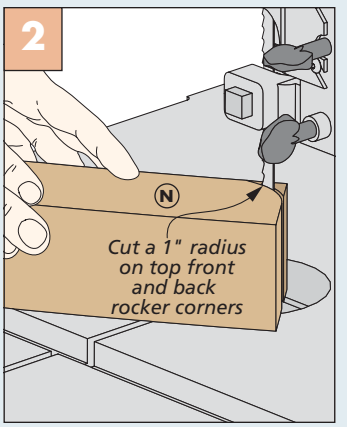
Figures 1 through 3 below illustrate the basics of the rocker construction. After cutting the core to shape and sanding it smooth, I resawed the veneers about ¼" thick. You'll joint them to their final 3/16" thickness after they're glued to the rocker core. When cutting the veneers to shape, leave a generous amount outside the cut line. This allows you some wiggle room when gluing the veneer to the core. The excess will be trimmed at the router table after they're glued to the core.

I glued the two veneer layers to the core with the rough, band-sawn face out. A couple passes over the jointer smooths the faces of the veneers before you trim them flush at the router table.

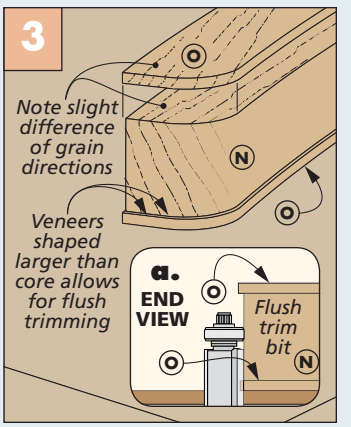
How-To: BUILD THE ROCKERS



Rocker Shaping. Cut the rocker core and veneer to shape at the band saw.



Rounded Ends. Cut a 1" radius at each end and then sand the core smooth.



Apply Veneer. Glue the veneer with the rough side out then joint and trim smooth.

The next task is to form the ⅛" roundover on all the edges.

ROCKER INSTALLATION. Attaching the rockers to the legs involves some hand work to get a good fit. The How-To box at right provides some guidelines to help you out along the way.

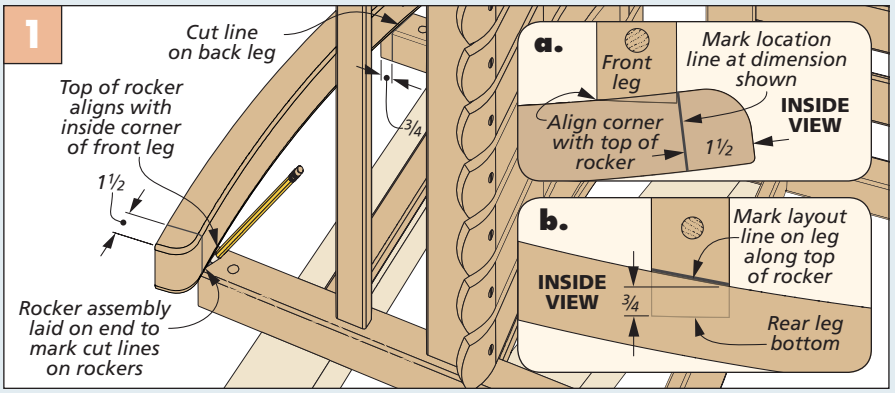
DEFINING THE CUT LINES. The end of each of the legs will be cut to conform to the shape of the rocker. In order to establish the guidelines, turn the rocker assembly on end on your benchtop and lay the rocker on the legs, as shown in Figure 1. It's important to position the rockers identically and according to the dimensions shown so that the rocking motion is smooth and consistent.

Shaping the legs is your next task. For this, I used a combination of hand saws, files, rasps, and sandpaper. Use the rocker to check the fit occasionally. Once you're satisfied, you can move on to marking the locations for the screws.

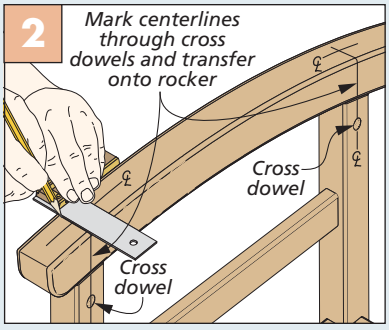
ATTACHING THE ROCKERS. Figures 2 and 3 at right show how I marked the locations for the screws. Project a centerline from the cross dowel to the bottom of the leg. Continue this line across the side and bottom of the rocker. Then strike a line to locate the midline of the rocker, as illustrated in Figure 2.

Use a hand drill to create a pilot hole through the rocker into the end of the leg. Try to keep the bit aligned with the leg's centerline. This ensures the screw engages the cross dowel to provide additional strength to the joint, as illustrated in Figure 3 above.

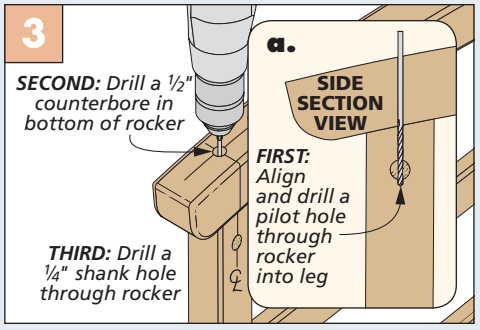
How-To: INSTALL THE ROCKERS



Positioning the Rockers. Using the dimensions shown, place the rockers on the legs to serve as a template for marking cut lines. Cut and shape the legs to the lines to conform to the rocker's curve, using the rockers to check your progress.



Locating Screw Holes. Mark the centerlines along the leg and rocker to find the centerpoint for drilling.



Drilling. Keep the drill bit aligned with the centerline of the leg to ensure the screw fully engages the dowel.

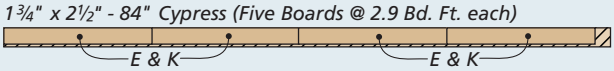
Now you can remove the rockers and drill the pilot holes to final depth. Replace the bit to drill the counterbores in the bottom of the rockers. Then you drill shank holes in the rockers for the screws and attach the rockers.

To provide lasting protection for the rocker, I applied a couple coats of penetrating oil (refer to Sources, page 67). Then you can enlist some help to carry the rocker to the front porch and relax with a tall glass of lemonade.

Materials, Supplies & Cutting Diagram

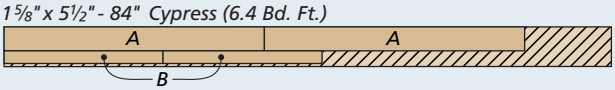
A	Rear Legs (2)	1⅝ x 3⁵⁄₁₆ - 36	**H**	Back Lower Rail (1)	¾ x 2½ - 44	**O**	Rocker Veneer (4)	³⁄₁₆ x 4¾ - 37 rgh.
B	Front Legs (2)	1⅝ x 1¾ - 22	**I**	Mortise Strip (1)	¼ x ¾ - 44			
C	Seat Rails (2)	¾ x 2½ - 43¼	**J**	Back Upper Rail (1)	¾ x 4½ - 44	•	(3) ⅜"-dia. x 36" Dowel	
D	Lower Front Rail (1)	¾ x 1½ - 44	**K**	Back Slats (11)	⅜ x 2¼ - 16⅜	•	(1) ½"-dia. x 12" rgh. Dowel	
E	Seat Slats (17)	1³⁄₁₆ - 2 x 20½	**L**	Corbels (2)	¾ x 1½ - 4⁹⁄₁₆	•	(6) #8 x 1½" Fh Woodscrews	
F	Upper Side Rails (2)	¾ x 3 - 18¼	**M**	Arms (2)	¾ x 4 - 21 rgh.	•	(1) ¾" x 6" - 4" Hardwood Wedge Blank	
G	Lower Side Rails (2)	¾ x 1½ - 18¼	**N**	Rocker Cores (2)	1⅝ x 4¾ - 37 rgh.	•	(4) #14 x 3" Fh Woodscrews	

1¾" x 2½" - 84" Cypress (Five Boards @ 2.9 Bd. Ft. each)

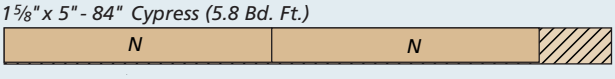


NOTE: *Part E resawn from 8/4 stock, remainder is used for part K*

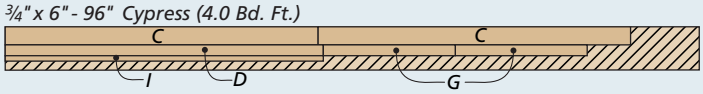
1⅝"x 5½" - 84" Cypress (6.4 Bd. Ft.)



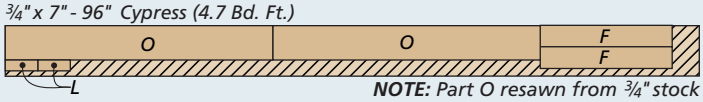
1⅝"x 5" - 84" Cypress (5.8 Bd. Ft.)



¾"x 6" - 96" Cypress (4.0 Bd. Ft.)

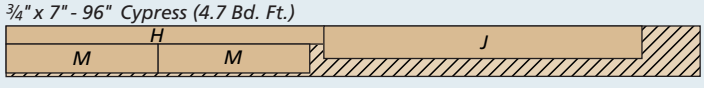


¾"x 7" - 96" Cypress (4.7 Bd. Ft.)



NOTE: *Part O resawn from ¾"stock*

¾"x 7" - 96" Cypress (4.7 Bd. Ft.)



creating joinery with a

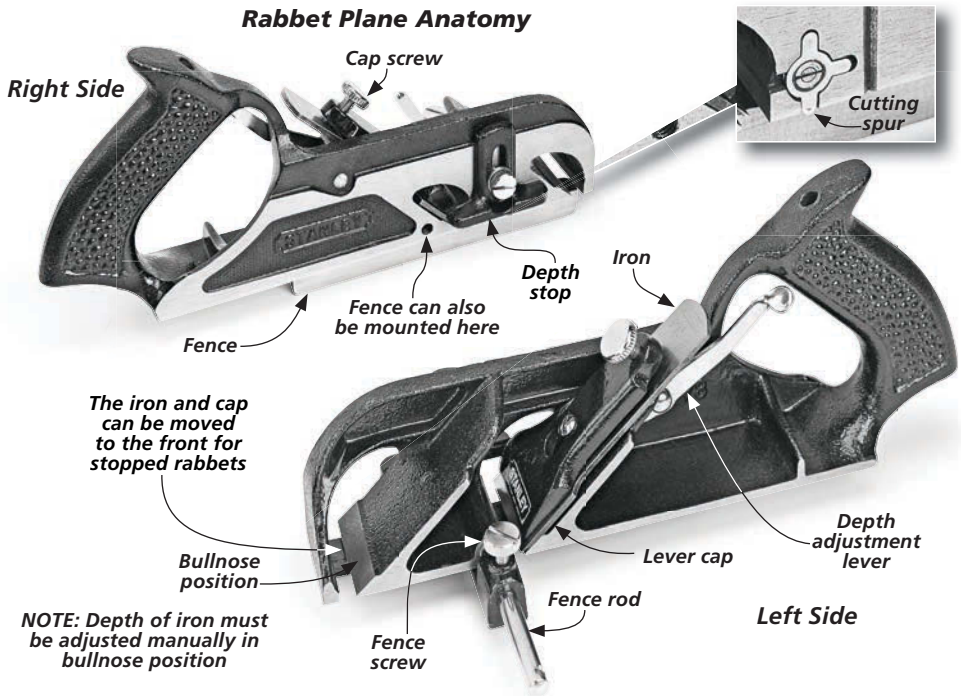
Rabbet Plane

Many years ago, my father gave me an old *Stanley No. 78* rabbet plane. After doing a little research, I learned how useful it is for cutting joinery. Often, I can be done with the work in less time than it would take to set up the router table or table saw. Plus, it's a lot quieter and doesn't generate clouds of sawdust.

PLANE FEATURES

The rabbet plane is sometimes called a fillester plane, a term common in England. The *Stanley* model in the photo below shows some common features. The iron extends to both sides of the plane's body to create crisp corners for joinery like rabbets, tongues, and tenons. The fence and depth stop determine the final width and depth of a rabbet, respectively. For crossgrain work, a cutting spur, or nicker, scores the wood fibers ahead of the iron to eliminate tearout.

DUAL PURPOSE. The *Stanley No. 78* and its modern counterpart, *12-978*, feature two positions where the iron can be located. That's why it's commonly called a duplex rabbet plane. The standard position for most joinery applications is with the iron in the rear position. The forward, "bullnose" position allows you to create stopped rabbets or work in close to a corner. You can see how this works in the box at the bottom of the next page.



USING A RABBET PLANE

Using a rabbet plane is pretty simple. You'll get the best results with a freshly honed iron. Then, when installing the iron in the plane, check to make sure that it's centered and doesn't protrude from the side of the plane. Tighten the cap screw to lock the iron in place.

DEPTH STOP & FENCE. The next steps involve setting the depth stop and fence, as shown in the photos at the top of the next page. Measure from the bottom edge of the plane to set the depth stop

according to the rabbet depth you need before tightening the screw.

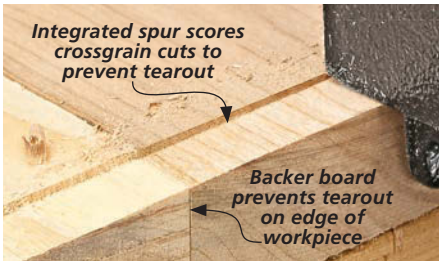
Setting the fence to establish the width of the rabbet follows along the same route. Just make sure the screw on the fence is tight so that the fence doesn't slip along the fence rod during use.

LONG-GRAIN RABBETS. When cutting rabbets along the edge of a board, this is all the setup you need to do. The rest involves workpiece placement and the technique for cutting the rabbet.

Clamping the workpiece so that the edge is flush with the front of the workbench ensures the workpiece is fully supported. More importantly, it provides plenty of bearing surface for the fence. Then you can start making light passes.

THE TECHNIQUE. Cutting a rabbet isn't like using a smoothing plane where you start at one end of the workpiece and make one long stroke to the other end. Instead, I like to use the technique illustrated in the drawings at right.

Make short strokes at the far end, keeping the fence tight and the plane flat on the workpiece. Gradually lengthen the strokes until you reach the opposite end. The plane should stop cutting when the depth stop contacts the surface



▲ To prevent tearout when cutting across the grain, rotate the cutting spur until the cutting edge projects below the plane.

▲ Use a steel rule to help you accurately set the depth stop. Make sure the foot of the stop is parallel with the plane's sole.

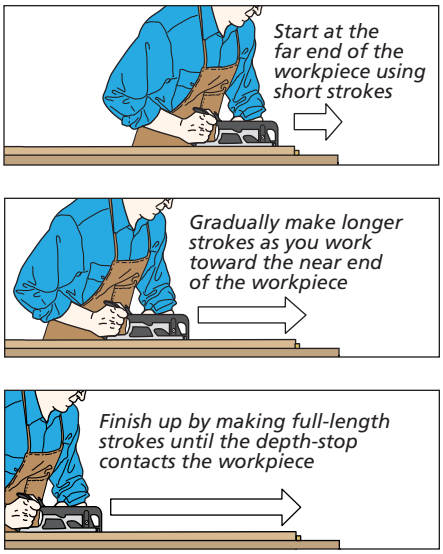
▲ After setting the fence position to determine the width of the rabbet, tighten the fence screw securely.

At times, you may find that the plane is cutting against the direction of the grain and causing tearout. If so, simply move the fence to the opposite side of the plane and come at it from the other direction. You just won't be able to use the depth stop with the fence on that side. In this case, I'll scribe a line on the edge of the workpiece as a stopping point.

CUTTING CROSSGRAIN. As I mentioned, the cutting spur comes into play when cutting across the grain (left photo). The face of the cutting spur should be flush with the side of the plane.

When using the spur, simply loosen the screw and rotate it until a cutting edge projects beyond the sole of the plane. Then tighten the screw.

To prevent tearout, clamp a backer board where the plane exits the workpiece. Otherwise, the technique for cutting a rabbet is the same as before.



Work Backward. *Start at the far end of the workpiece and work your way back, making progressively longer strokes.*

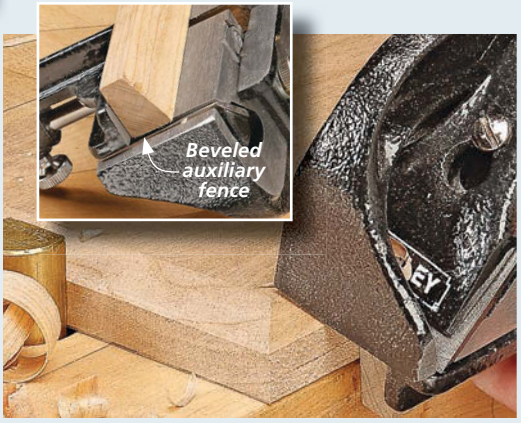
QUIET & EFFICIENT. With a little practice, you'll be creating joinery in no time at all. The best part is, you can do it without all the noise of power tools.

How-To: STOPPED RABBETS & RAISED PANELS

A duplex rabbet plane is a multipurpose tool. Moving the blade up front to the bullnose position allows you to cut stopped rabbets (left photo). First, chisel out a relief notch that matches the final size of the rabbet. Then use the same technique shown above to complete the rabbet.

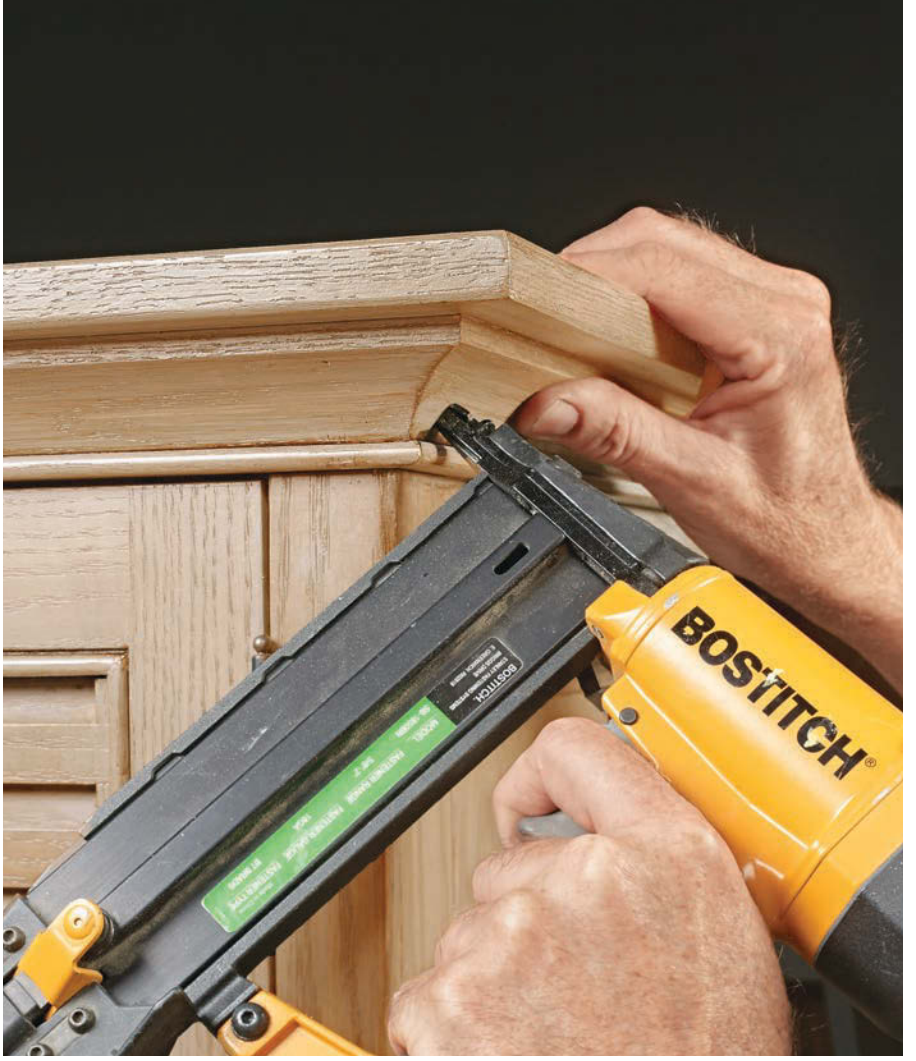
Making small raised panels for lids or doors is also easy to do. Cut a beveled auxiliary fence and attach it to the plane's fence with double-sided tape. Plane the crossgrain ends first using a backer board, then go back and plane the long-grain edges (right photo).

▲ A relief notch provides room for the plane's nose when cutting stopped rabbets using the bullnose position.



▲ To cut chamfers or bevels on small raised panels, simply use double-sided tape to fasten a beveled auxiliary fence to the plane's fence.

work better & faster with Pins & Brads



Many woodworkers enjoy the satisfaction of assembling a project using traditional joinery methods and glue alone. When a mortise fits just right in a tenon and creates a sturdy connection, it's tough to beat. Perhaps this sentiment is why some tend to turn up their noses at the addition of pins and brads.

However, I would argue that pins and brads play an important role in the modern woodshop. For one thing, today's air nailers are so effective (and so good at hiding their fasteners) that it's okay to lean on them every once in awhile in your projects. Plus, the small nailers required for driving pins and brads only need compact, inexpensive air compressors to power them properly. Some manufacturers have even begun to offer cordless versions.

The secret, of course, is to know the right situations for using pins and brads, as well as the proper techniques for making those fasteners virtually disappear on your finished projects.

FASTENER OPTIONS. The first thing it helps to understand is the sizes of fasteners available for your projects. When it comes to air-driven fasteners, the differences are pretty easy to understand. The size is measured in gauge, or the diameter of the nail. And the larger the number, the smaller the diameter (as well as the hole it will leave behind in wood).

Keeping that in mind, the smallest diameter nail is a pin nail, which is 23 gauge. Pins also don't have a head, which makes them even less perceptible in your finished work. Brad nails, on the other hand, are 18-gauge with a head, so the hole left behind is larger (photo below).

The other differences to be aware of are the length of the fasteners. Pin nailers accept fasteners that range from ½" or ⅝" all the way up to 1" or 1⅜", with the larger-capacity nailers being a bit more expensive. I've found it's worth the extra money for the higher-capacity nailer to be able to fasten ¾" stock more easily. Brad nailers fire fasteners that range in length from ⅝" to 2" or 2⅛". This gives you plenty of range for most woodworking projects.

There are also 16- and 15-gauge finish nails. In my opinion, these larger nails are better-suited for home improvement tasks like installing trim or baseboards.

WHEN TO USE THEM. I like to think of pins and brads as little helpers when I don't have enough clamps or when I need to work in awkward areas where clamps just won't fit. Then I'll rely on either my brad nailer or pin nailer, depending on the task at hand.

▲ An 18-gauge brad offers more holding power but leaves behind a larger hole. The headless, 23-gauge pin creates a hole that's hardly noticeable on the surface of the project.

The barely perceptible holes left behind by a pin nailer makes it ideal for joining small parts together. I'll sometimes use one for applying edging to shelves, for example (near right photo). They're also great for reinforcing mitered corners (lower right photo). In most cases, the pin offers reinforcement to hold the joint together until the glue dries.

If the workpiece needs more holding power, that's where the 18-gauge brads come into play. Crown molding at the top of a cabinet is a good example (main photo, opposite page). I also like brads for attaching a panel to the back of a cabinet, as shown in the far right photo.

WHAT LENGTH FASTENER? Since I often use nails with glue, the length of the pin or brad isn't critical. But a good rule of thumb is to have the fastener extend ¾" to 1" into the mating piece. Of course, you may need to adjust the fastener size based on the thickness or width of the mating part that will accept the nail.

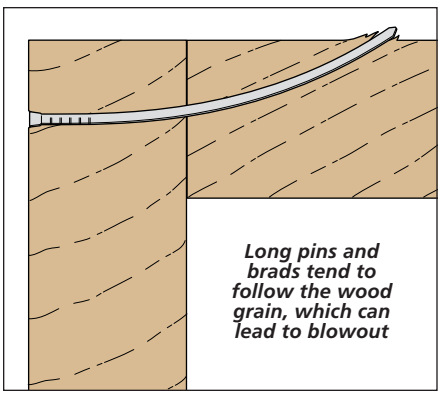
▲ If you don't have a lot of clamps, pin nails are great for installing edging on shelves. You can fill the tiny holes later on.

▲ I like the strength (and larger heads) of 18-gauge brad nails for installing cabinet backs quickly and easily.

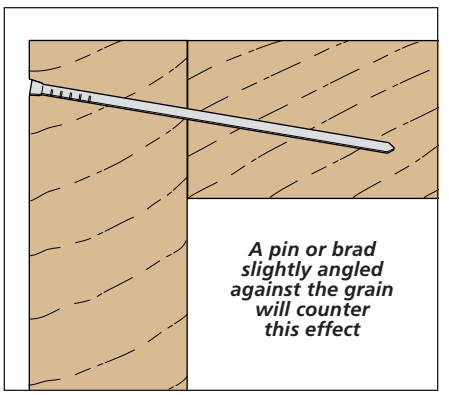
NAILING TECHNIQUES. Pins and brads are small-diameter fasteners, so there's always a risk that they will curve and blow out the face of a piece, especially in thin or narrow stock. One trick is to tilt the nailer ever so slightly toward the side of the joint that won't show (such as the bottom of a shelf). This not only lessens the chance of a mistake, but a slightly angled nail provides a stronger connection. The drawings on the left illustrate the wrong and right way to go about it.

In addition, look for ways to hide the heads of the fasteners in your work. Driving them into the darker grain of wood, for example, or using stainable wood filler are two methods for making the holes virtually disappear (lower left photos). In most situations, you can also find a way to drive in the fastener so that you won't see it (lower right photo).

There's no reason to look at pins and brads as "cheating." In the right situations, they can improve your work, and chances are nobody will even notice them in the finished project.



Blowout. Driving a long pin or brad straight into wood can cause it to curve and "blow out" on the show side.



Angle It Slightly. Tilt the nailer very slightly toward the "non-show" side of your work to avoid blowout.

How-To: TIPS & TRICKS FOR DISGUISING HOLES

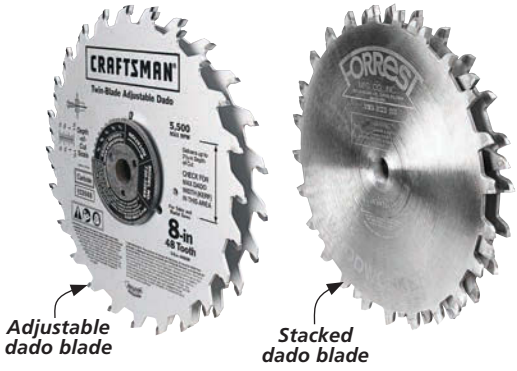
Dark Grain. The natural grain variation found in wood usually offers some perfect locations for hiding fastener holes.

Wood Filler. The stainable wood fillers available today work well. After stain is applied, the hole is barely noticeable.

Hide Them. Look for areas on projects (like this frame bottom) to drive in the fasteners so they'll virtually disappear.

choosing & using Dado Blades

You've probably noticed as you flip through the pages of *Woodsmith* that almost every project is built with assistance from a dado blade. And there's a good reason for that. If you're looking to expand your abilities beyond basic cuts, few accessories can do that quite like a dado blade. It takes your table saw from a simple cutting tool to a joinery-making machine capable of forming dadoes, grooves, and rabbets with ease. When you're getting started, the first step is finding one that cuts cleanly and accurately and can do everything that you'll want it to do.

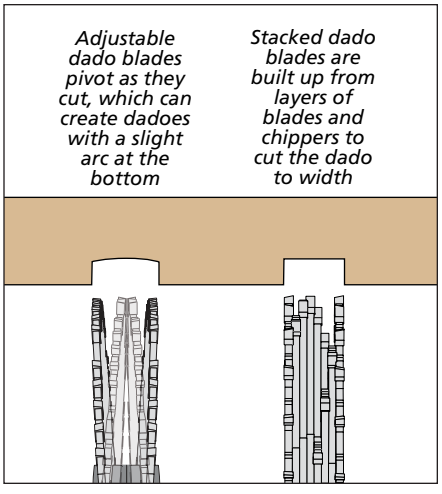


▲ Adjustable dado blades are less expensive, but stacked blades are easier to set up accurately and yield cleaner cuts.

DADO BLADE BASICS. As far as the design of dado blades goes, there are two options: adjustable blades or stacked blades (photos below). Most adjustable blades work by skewing the blade (or blades) at an angle on a split hub. As a result, the blade cuts a wide swath, creating a dado. The more you skew the blade, the wider the dado becomes.

Though adjustable dado blades are less expensive (usually $30 to $50), they make it more difficult to dial in an accurate cut since it's tough to measure the width of the blade's cutting area. Adjustable blades form a flat-bottomed dado when set for a narrow cut, but they tend to form a slight arc at the bottom of the dado as you set the blade to cut wider (refer to the drawing above).

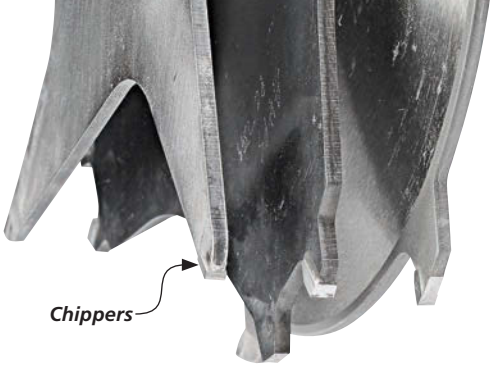
They might be pricier ($80 to over $200), but in my opinion, a stacked dado blade is a better option. These are comprised of sets of cutters that you can use in different combinations. These components include the outer scoring blades, which



form the shoulder of the dado; chippers, which can be stacked in different configurations to cut dadoes of varying thickness; and shims, which allow you to fine-tune the thickness of the stack for precise cuts.

THE RIGHT BLADE. Most stacked dado blades can be set up to cut dadoes ranging from ¼" to 29/32" or so. But beyond that similarity, stacked dado blades from different manufacturers can vary quite a bit from one another. This can make choosing one for your shop a bit of a challenge.

▲ You'll find outer scoring blades with different numbers of teeth, set at different hook angles. Negative hook angles tend to leave smoother cuts than positive ones.



▲ Dado sets offer chippers with different thicknesses and numbers of teeth. Sets with more teeth and more chippers are preferred.

▲ Stagger the teeth as you form a dado stack to allow clearance between them.

The first variable to contend with is the diameter of the blade. They're available in 6" or 8" diameters. In almost all situations, I would spend a few extra dollars for an 8" blade. Not only does it offer more capacity, but the larger diameter blade cuts faster, yielding a cleaner cut.

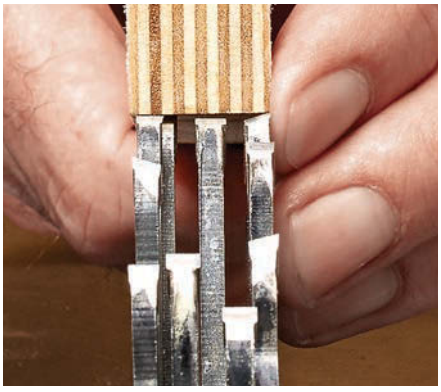
The teeth on the scoring blades also vary in number and hook angle. You can see a few different examples in the left photo above. The number of teeth can range from 12 to 42, and they may have a negative or positive hook angle (drawing below). In my experience, anything with 20 teeth or more yields a smooth cut.

Chippers also vary in quantity, as well as number of teeth, in different dado sets (upper middle photo). In general, a set with more chippers (for example, six instead of three) is preferable because it gives you more setup options for your blade. And chippers with more teeth tend to leave smoother cuts.

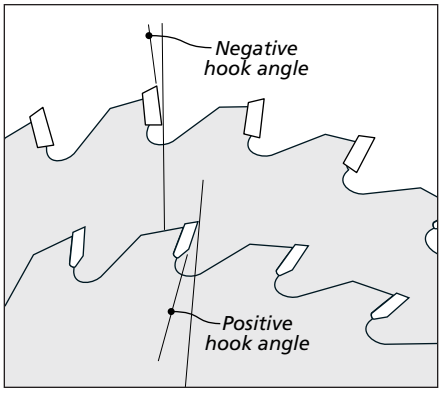
SET UP TO CUT. After you decide on the right dado blade, a few tips will get you started. First, it's important to stagger the teeth on adjacent chippers or blades. The teeth extend past the blade body, so this step prevents plate deflection as you tighten the arbor nut (upper right photo).

One thing that beginners often find challenging is finding the right combination of blades, chippers, and shims for the cut at hand. Since a dado or groove is usually cut to match a mating part, use the part itself to check the thickness as you're setting it up (left photo). Then, make a test cut and check it again to make sure it matches.

With the right dado blade installed, you're now ready to see what your table saw is truly capable of. You're sure to be pleased with the results. W



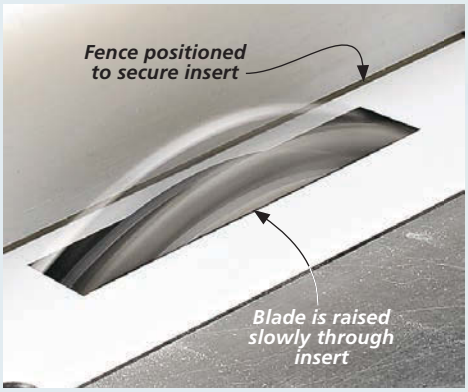
▲ By using a scrap of wood from the mating workpiece, you can dial in your dado blade to cut at the precise width you need.



Hook Angle. A scoring blade with a negative hook angle will cut less aggressively, resulting in less tearout.

How-To: ZERO-CLEARANCE INSERTS

Along with a dado blade, you'll likely want to invest in a few throat insert blanks for your table saw. The reason being is that you want to cut dadoes with the blade totally surrounded by the throat insert to reduce chipout. So you'll actually create zero-clearance throat inserts with the blade before you make cuts. You can do this by locking the insert in place, turning on the saw, and slowly raising the blade through the insert. Once you're done using it, label it and store it for the next time you need to make a cut at that width.



▲ To make a zero-clearance insert for your blade, lock down the insert, turn on the saw, and raise the blade slowly through the insert.

▲ Keep inserts for your most common cuts on hand so you'll always have a matched one at the ready.

smooth, accurate &

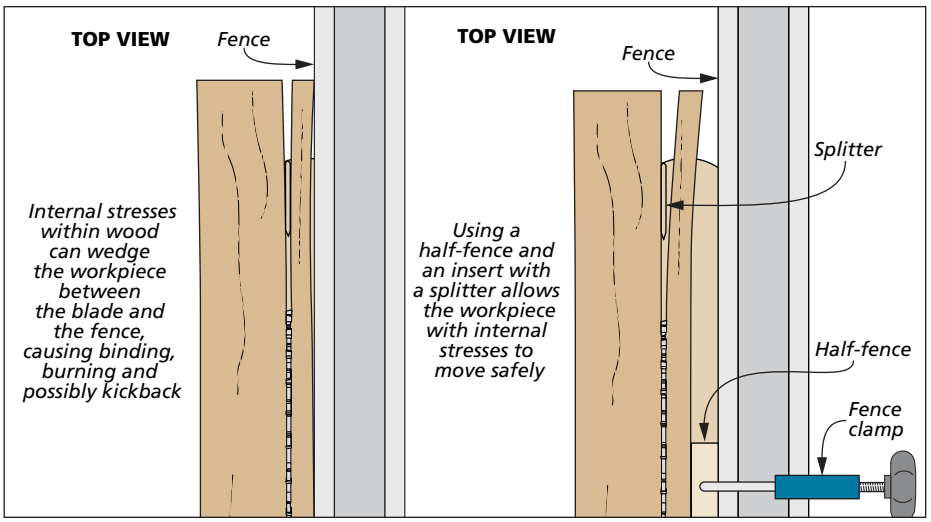
Safe Rip Cuts

Ripping boards to width is one of the main tasks for the table saw. Mastering this fundamental skill will put you on the road to building better projects. Making smooth, accurate rip cuts requires the combination of a good setup, using the proper technique, and anticipating and heading off problems.

Some of those problems include blade marks, burning, and even kickback. As in most things in woodworking, there's more than one method to approach the job. I'd like to talk about one ripping technique that you may not be familiar with — using a half-length rip fence.

The table saws we're familiar with have a rip fence that extends the full length of the saw table to guide the workpiece before, during, and after the cut. But if the rip fence doesn't lock down parallel to the blade, the workpiece could be directed toward the back of the blade, which can cause kickback.

In addition, tensions in the board can be released during ripping that can cause the kerf to open or close up. The drawing below shows what I'm talking about. Both can increase the effort required to complete the cut and may lead to blade marks or kickback.



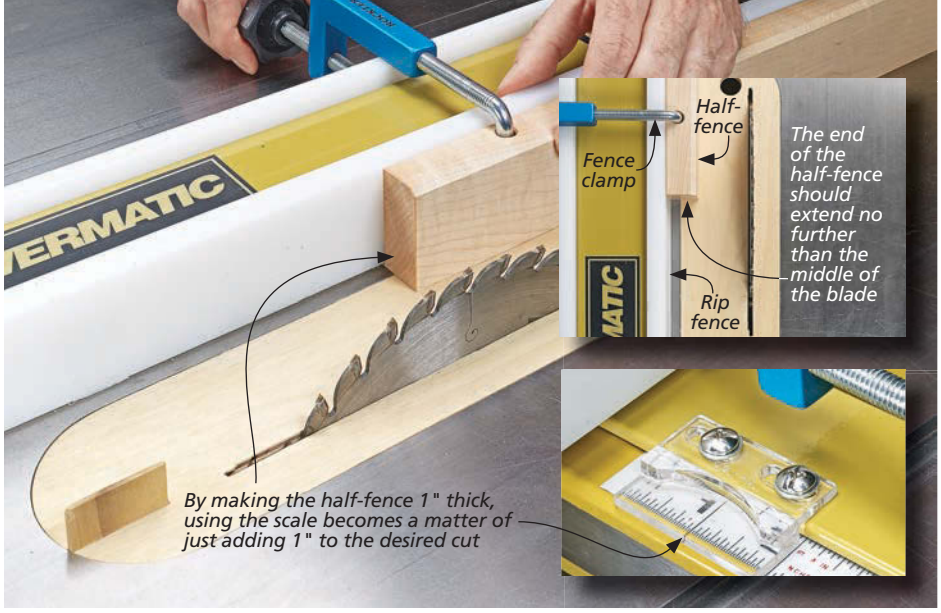
HALF-FENCE RIPPING. Table saws in Europe take a different approach to ripping. On a European saw, the rip fence only extends to the middle of the blade. The result is that immediately after the cut is made, the workpiece has more room to move without binding (drawing below).

The difference in setups has to do with function. Table saws in North America are equipped to do more tasks like joinery. For the most part, European saws are meant simply for cutting parts to size from hardwood or sheet goods.

So is one setup better than the other? Not necessarily. But I was intrigued enough with the idea to try it out. What I discovered is a technique that can make ripping solid wood straightforward. If you've experienced some of the problems I mentioned earlier, this approach is worth looking into.

SETUP. The half-length fence is what makes this setup look so unusual. Before I get to that, however, there are a couple ripping must-haves that deserve a mention no matter what technique you use.

The first is to make sure your saw is equipped with a splitter or a riving knife. These keep a workpiece from contacting the back of the blade. I like to use a zero-clearance insert that has a hardwood splitter glued in place behind the blade.



▲ This is the setup for using a half-length rip fence. Attach the hardwood fence to the rip fence so that the end of the half-length fence is aligned with the midpoint of the saw blade. A splitter in a zero-clearance insert provides another level of safety for rip cuts.

▲ The splitter and half-fence stabilize the workpiece so that it travels in a straight line throughout the cut.

The other item is to use a push block when cutting narrow parts (less than 6" wide). There are different styles available and you can certainly make your own, as well. One that combines a long base with a heel at the back is ideal for providing good downward pressure on the workpiece as you guide it through the blade. Turn to page 67 to find sources for the push block.

HALF FENCE. In order to reap the benefits of a half-length rip fence, you can make a clamp-on auxiliary fence for your table saw. It's very similar to adding an auxiliary fence for cutting rabbets.

The one shown here is made from hard maple. What's important is that the piece is straight and flat for accurate cuts. I sized the fence so it's exactly 1" thick. This way, I can still use the scale on my rip fence to quickly set the width of cut (lower inset photo above). I just need to remember to add an inch when setting the fence.

The fence extends just to the center of the blade creating a free space on the back side of the blade, as shown in the upper left photo. When combined with the splitter, this is what makes the setup so safe. The fence is attached to the rip fence with special clamps that fit into holes drilled in the top edge of the half fence.

MAKING THE CUT. Putting this technique to work really isn't any different than ripping a board on the table saw with a full-length fence. The first time I tried this technique, I expected to feel the workpiece drift near the end of the cut. But that just wasn't the case. Instead, the workpiece moved arrow-straight through the blade, as in the upper right photo. More importantly, the width of the workpiece was consistent front to back. The open space behind the blade meant the workpiece was free of accidental blade marks or contact with the blade.

At the beginning of the cut, your focus is on holding the piece against the rip fence with your left hand. Your right hand feeds it into the blade (main photo).

Once the workpiece is engaged, the blade, fence, and splitter combine to keep the part moving straight. Now you can turn your attention to feeding the workpiece at an even rate and watching the progress of the cut.

TWO USES. After a few initial test cuts, I started thinking about some applications where a half-length fence might help me get better results. The obvious one is breaking down long, wide boards, as in the main photo on the previous page. These may have internal tensions that are released as the board is cut. This setup gives those kinds of boards the freedom to distort without causing a dangerous situation. Another task is shown in the box at left.

I admit that using a half-length fence may feel a little different than what you're used to. But it offers some solid benefits to making safe, accurate rip cuts. Whether it becomes your go-to ripping technique or not, it will add to your skill set for getting the most out of your table saw. Go ahead, give it a try. W

How-To: RIP THIN STRIPS

Breaking down wide boards into project parts isn't the only way to put a half-length rip fence to work. Another great application is in cutting thin strips. I often cut thin strips of wood to conceal the edges on plywood panels. These thin strips can get stuck between the blade and rip fence. Besides blade marks, there's a possibility for the strip to zing backwards. A half-fence technique lets those parts fall safely away from the blade while giving you accurate, consistent cuts.

▲ Thin strips won't get jammed between the blade and fence with this setup. The results are smooth, accurately sized strips.

tips from our shop

Shop Notes

Slat Sanding Jig

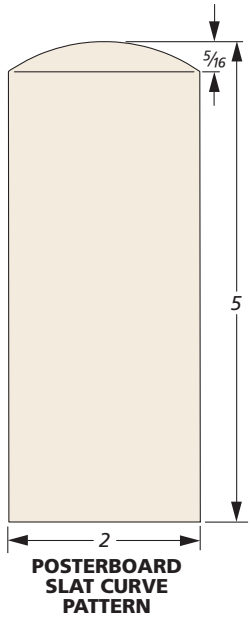
While working on the seat slats for the rocker on page 44, I struggled with how to lay out and shape the rounded end consistently from slat to slat. Trying to lay out a curve on the shaped slat was tricky. Plus, holding the slat by hand at the disc sander was awkward.

MAKING A PATTERN. A piece of posterboard turned out to be the ideal solution to the layout problem. As illustrated in Figure 1, all you need to do is cut a strip of posterboard the same width as the seat slat. Then lay out and cut the curve before using it as a pattern to transfer the curve to the seat slat.

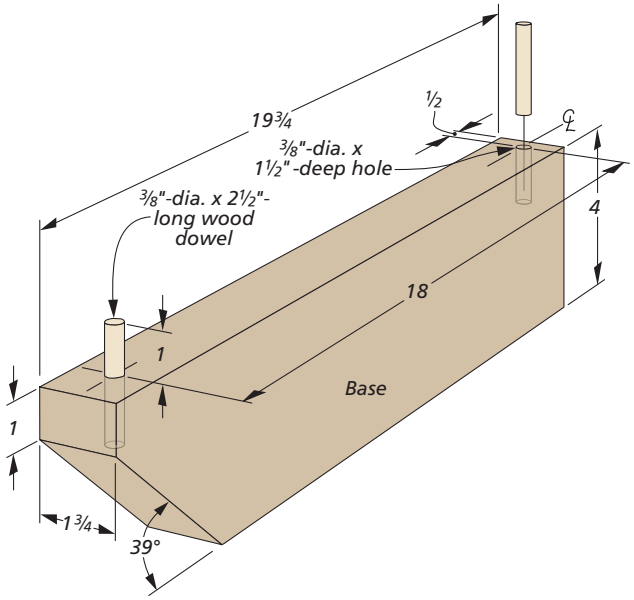
The drawing at the lower left shows how to shape the posterboard pattern. To use it, hold it securely to the bottom face of the seat slat with the end of the pattern flush with the end of the slat. After marking the curve on each slat, you're ready to make a jig to help with the final shaping at the disc sander.

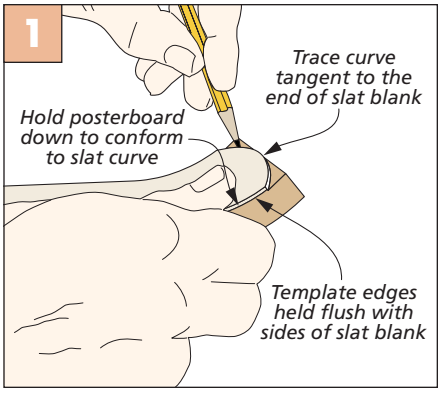
EASY-TO-BUILD JIG. For a safe, secure way to shape the slats, the jig you see here is a simple but effective solution. It's a thick blank with a beveled end to hold the seat slat upside-down at the proper angle. The holes in the slat fit over a pair of dowels to hold it securely.

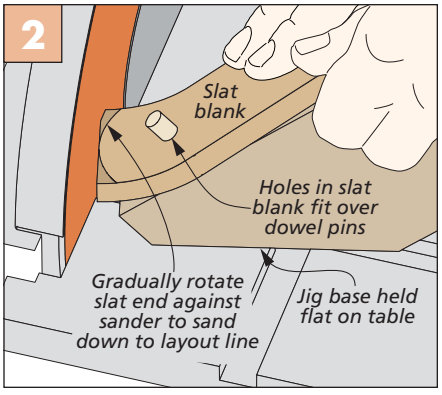
The seat slat fits on the jig with the bottom face up, as shown above. This keeps the edge of the curve square to the face of the seat slat. The beveled end of the jig sits flat on the sander's table. All you need to do is rotate the jig against the sanding disc and sand to the layout line you created earlier. The process goes pretty quick for consistent results.



POSTERBOARD SLAT CURVE PATTERN







Slat-Cutting Jig

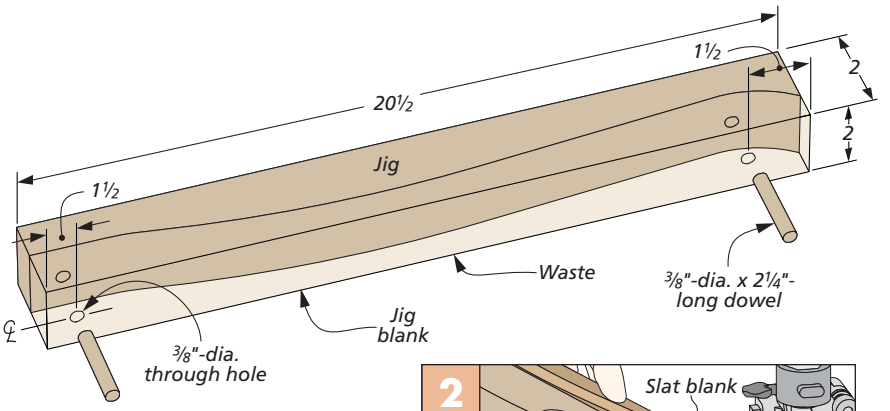
Cutting the seat slats for the porch rocker is an ideal task for the band saw. But once you cut one face of the slat, the resulting blank is pretty thin. It's difficult to keep it sitting flat on the band saw table while cutting the opposite face.

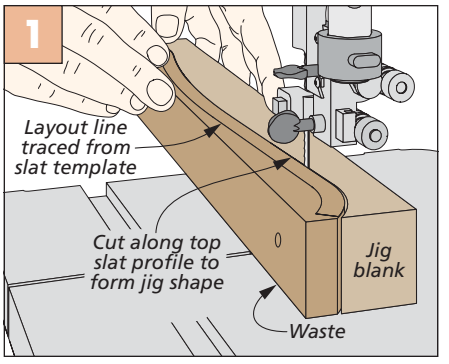
SHAPED JIG. To provide a more reliable and steady way to hold each slat blank for both cuts, I made the jig shown at right. The main drawing shows what the completed jig looks like. It's two-sided — one side holds the slat blank while cutting the top surface of the slat to shape. Then you move the slat blank to the opposite side of the jig to cut the bottom face of the slat.

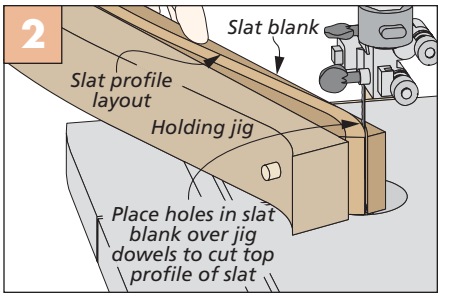
To make the jig, cut a blank to the size shown in the main drawing. Drill a hole at each end of the jig to accept a dowel. The dowels register and hold the slat blank in place on the jig.

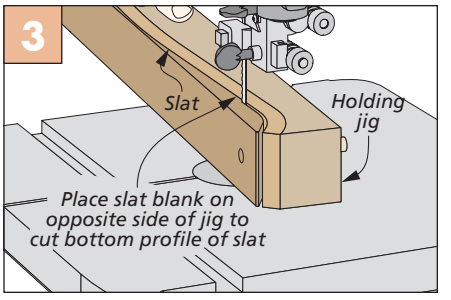
Use the pattern for the seat slat (page 48) to lay out the shape of the top of the slat, as shown in Figure 1. After cutting the jig to shape, glue two dowels into the holes, making sure they project at least ½" from each side. (Any extra length will be cut off when you cut the first slat to shape.)

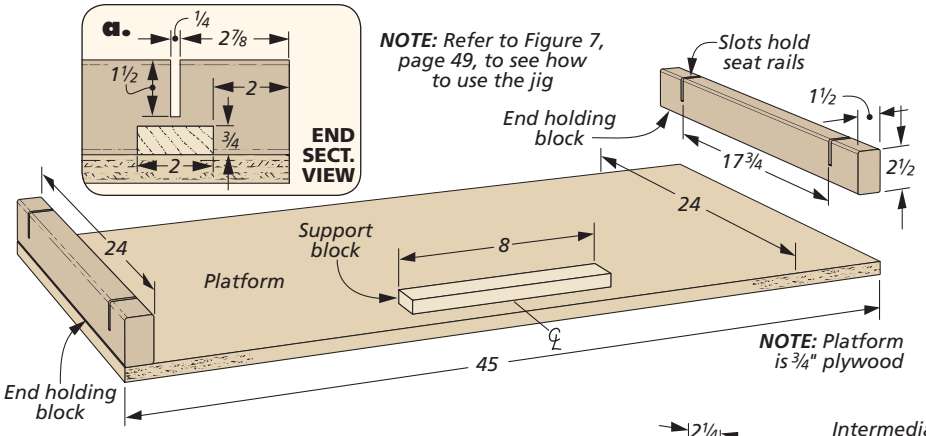
Figures 2 and 3 show how to use the jig to support the slat blank during each cut before sanding the curve on the end.











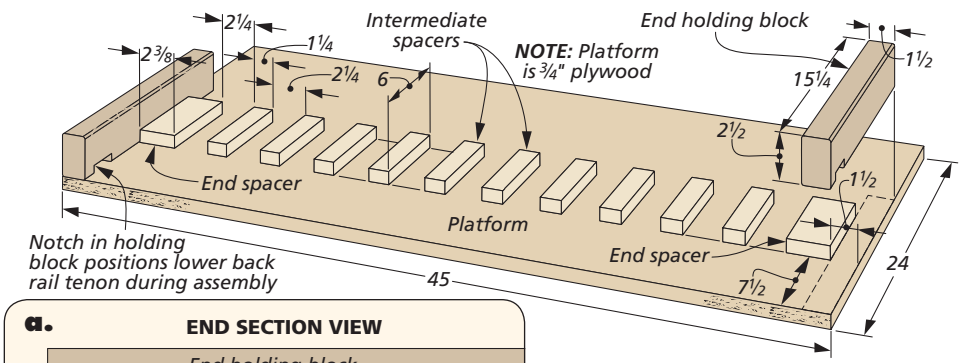
Seat Assembly Platform

When attaching the seat slats for the rocker to the seat rails, I found it helpful to make a jig to hold the seat rails steady as I attached the slats. The details are provided in the drawings at left. This jig makes it easier to insert the dowels and wedges that secure the slats to the rails. The jig properly spaces the rails to align with the holes in the slats and keeps the rails from bouncing as you drive the wedges into the dowels.

Back Assembly Platform

Like the seat assembly platform, the one shown at right makes it easier to lay out the slats for the back of the rocker. It holds them in place while the curve on the upper rail is marked.

When it comes time to apply the glue to assemble the seat back, the jig helps position the slats with equal spacing and square to the bottom rail of the seat back. It also properly spaces the rails so the tenons on the ends of the rails fit the mortises in the rocker's legs after the glue on the assembly dries.



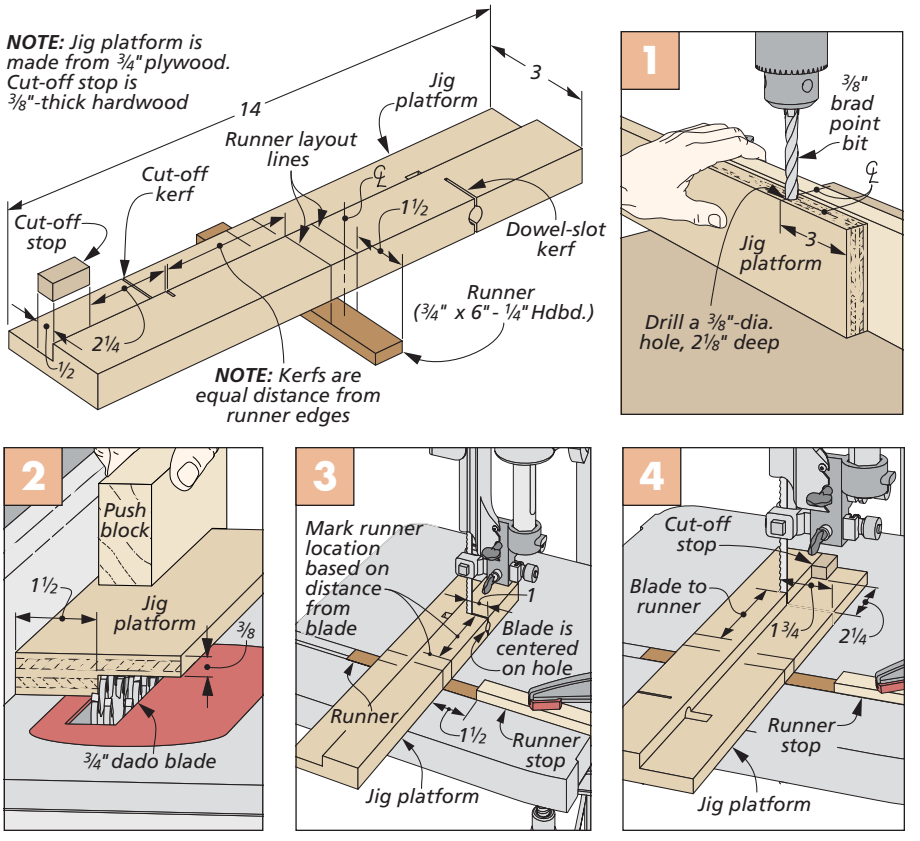
Dowel Slotting Jig

To secure the seat slats on the rocker (page 44), you need to cut 34 dowels to length and create kerfs in them for wedges. I used the dual-purpose band saw jig you see at right. One end of the jig is used to trim the dowel to length. Rotate the jig 180° to cut the slot in the dowel.

EASY CONSTRUCTION. Start by drilling a hole on one edge at the drill press, as shown in Figure 1. This hole secures the dowel when cutting the slot for the wedge.

Next up, cut a wide rabbet along one face (Figure 2). The ledge created acts as a support for a long dowel when cutting the shorter pieces to length.

FINISH UP. Attach a hardboard runner so the blade is centered on the hole drilled, as shown in Figure 3. After cutting the first kerf in the hole, rotate the jig and cut a second kerf on the opposite edge, as you can see in Figure 4. Be careful to cut only to the depths shown at right. Finally, add a hardwood stop to one end for consistent cuts (main drawing).



Insert Plate Opening

Creating an opening for a router insert plate is usually a pretty straightforward task. However, the opening for this insert plate requires threaded inserts to secure the insert while the table is flipped upright for horizontal routing. The solution for making it comes in the form of using two templates and three router bits.

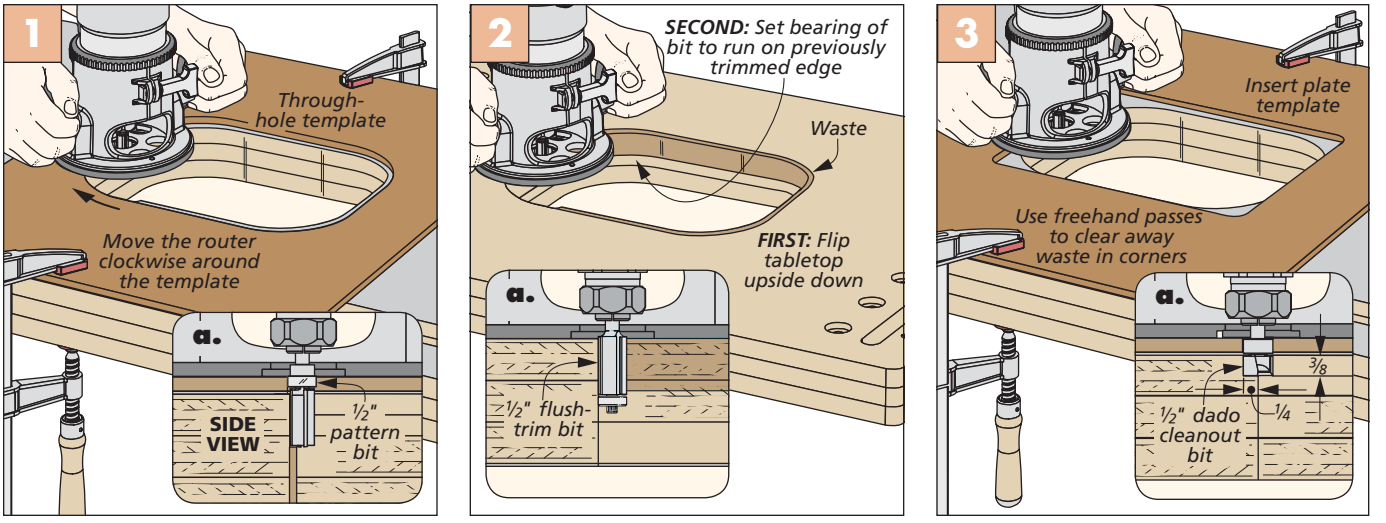
The opening in one of the templates is sized to match the insert plate. The other template is sized for the smaller opening. The dimensions for the openings are found on page 38. I used the template with the smaller through opening to trace the opening on the tabletop and cut out most of the waste with a jig saw.

SMALL OPENING. Turning the rough cutout into a smooth, even opening starts with using a pattern bit to trim the edge of the opening flush with the template (Fig. 1).

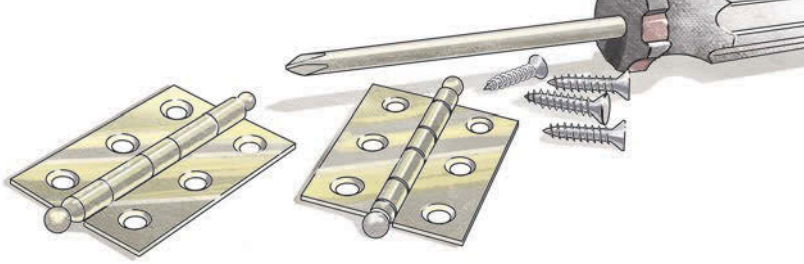
My pattern bit wasn't long enough to trim all three layers of the tabletop. To complete the job, I flipped the tabletop upside-down and used a flush-trim bit. The bearing on this bit follows along the smooth edge that was just created, as in Figure 2.

INSERT PLATE OPENING. Now you're ready to make the larger recess to house the insert plate. Remove the first template and install the second template centered over the opening. Since this recess is shallow, you need to use a dado cleaout bit, which has a short cutting length so the bearing can follow the template.

The router bit depth should match the thickness of the router insert plate, as shown in Figure 3. In the corners, you need to make a few back-and-forth passes to clear out the remaining waste.



hardware & supplies
Sources



Most of the materials and supplies you'll need to build the projects are available at hardware stores or home centers. For specific products or hard-to-find items, take a look at the sources listed here. You'll find each part number listed by the company name. See the right margin for contact information.

TIPS & TECHNIQUES *(p.5)*

- **Amazon**
  8 oz. Jars. B00YQBYQ7W

CYPRESS *(p.10)*

Pecky cypress is available from several sources, such as: *Bruner Lumber Company* and *Cypress Wood & Lumber*.

DRAWER LOCK BITS *(p.12)*

- **Rockler**
  Single-Tongue. 22637
  Large Single-Tongue. 31202
  Double-Tongue 92123
- **Lee Valley**
  Single-Tongue. 16J76.72
  Double-Tongue 16J76.62

DUST COLLECTION *(p.14)*

- **Rockler**
  Small Port Hose Kit 48212
  FlexForm Hose Kit 33646
  Shop Vacuum Hose Kit . . . 32989
- **Woodcraft**
  Rigid Flex Set 150512
  Vacuum Hose Assembly . .152676
- **Infinity Cutting Tools**
  Drillnado. 115-120

Loc-Line 2½" vacuum products are available from *Lee Valley* and *ModularHose.com*.

DISPLAY SHELF *(p.18)*

- **Amazon**
  5mm Router Bit B000P173ZY
- **Widgetco**
  3mm shelf pins . . .1-3MM-BRS-SS

The display shelf was given one coat of primer and then painted with two coats of black paint.

BRASS COMPASS *(p.22)*

- **McMaster-Carr**
  3/16" x 1" - 24" Brass . . 8954K174
  3/16" x 1" - 6" Brass . . . 8954K177
  O1 Tool Steel. 9018K13
  1/4"-20 Thumbscrew . . 92421A535
  #8-32 Thumbscrew. . . 92421A192
  Bronze Bearing 6381K102
  1/4"-dia. Brass Rivet . . 97500A180
  3/16"-dia. Brass Rivet. . 97500A150
- **Rio Grande Jewelry Supply**
  Brass Wire Solder 132201
  Grifflux #1 Flux 504089

Many of the parts for the brass compass are also available at most hardware stores.

BOAT BOOKCASE *(p.26)*

The interior, gunwales, breasthook, and stern thwart were brushed with two coats of amber shellac. The exterior was painted with *Benjamin Moore*'s Green Meadows (Eggshell Finish) and wiped slightly with a paint pad while wet to expose some of the wood grain. Two coats of lacquer were applied for the final finish.

ROUTER TABLE *(p.34)*

- **McMaster-Carr**
  ½"-13 Insert Knob 6042K81
  ½"-13 T-Nuts. 90975A033
  ⅜"-16 Studded Knob . . 62215K56
  Mending Plate 1030A15
  ½"-13 Studded Knob . . 62215K58
  4½" Hand Wheel 6033K71
  5/16"-18 Studded Knob . 62215K53
  ¼"-20 Insert Knob 6042K77
- **Rockler**
  Magnetic Catch 1009262
  Power Tool Switch 20915
  Dust Collection Port 21528
- **Kreg Tool**
  Combo Trak. KMS7448
  Router Plate PRS3038
  Mini T-Track. KMS7509
  Jig & Fixture Bar KMS7303
- **Lee Valley**
  Toggle Clamp 17F72.02
- **Nevamar**
  Lam. (Maritime Gray) S6027

The case of the router table was painted with *Benjamin Moore*'s Calm Cream (Eggshell Finish).

PORCH ROCKER *(p.42)*

To provide protection for outdoor use, the rocker was finished with two coats of transparent cedar *Penofin Ultra Premium* penetrating oil finish. Apply a new coat every year or two.

RABBET PLANE *(p.56)*

- **Amazon**
  Rabbet Plane B00009OYFU

HALF-LENGTH RIP FENCES *(p.62)*

- **Rockler**
  Fence Clamps 31373
- **Infinity Cutting Tools**
  Push Stick 100-346

MAIL ORDER SOURCES

Project supplies may be ordered from the following companies:

Woodsmith Store
800-444-7527

Rockler
800-279-4441
rockler.com

amazon.com

Benjamin Moore
855-724-6802
benjaminmoore.com

Bruner Lumber Company
850-855-0086
floridabackwatercypress.com

Cypress Wood & Lumber
225-625-2396
cypresswood.net

Drillnado
317-946-7506
drillnado.com

Infinity Cutting Tools
877-872-2487
infinitytools.com

Kreg
800-447-8638
kregtool.com

Lee Valley
800-871-8158
leevalley.com

McMaster-Carr
630-833-0300
mcmaster.com

modularhose.com
800-759-2839

Nevamar
877-726-6526
nevamar.com

Penofin
800-736-6346
penofin.com

Rio Grande Jewelry
800-545-6566
riogrande.com

Widgetco
800-877-9270
widgetco.com

Woodcraft
800-225-1153
woodcraft.com

looking inside

Final Details

Display Shelf. Adjustable shelves and dividers allow you to configure this shadow box display shelf in a number of different ways to suit your items at hand. We'll walk you through building the project beginning on page 18.

Boat Bookcase. While it may not be seaworthy, this whimsical bookcase is sure to be a conversation starter in your home. Details like the plank back and gunwale sides carry the nautical theme even further. To learn more about how it's constructed, turn to page 26.

Porch Rocker. What do you get when you cross a porch swing with a rocking chair? This classic porch rocker for two. Curved seat slats make it as comfortable as it is attractive. Step-by-step instructions start on page 44.

Combination Router Table. This ordinary-looking router table actually does double duty. Just loosen a couple of knobs and swing the table up 90° to transform it into a horizontal router table. Complete plans start on page 34.